A MANUAL

OF

CLINICAL MEDICINE.

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OF

CLINICAL MEDICINE,

AND

PHYSICAL DIAGNOSIS.

BY

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Second American Edition,

TO WHICH IS ADDED

THE CODE OF ETHICS

OF THE

AMERICAN MEDICAL ASSOCIATION.

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TO

ROBERT BENTLEY TODD, M.D., F.R.S.,

PHYSICIAN TO KING'S COLLEGE HOSPITAL, ETC.,

THIS MANUAL IS DEDICATED,

BY HIS

FRIEND AND FORMER PUPIL,

THE AUTHOR.

PUBLISHERS' ADVERTISEMENT.

In presenting to the profession of the United States this admirable little volume, the publishers have thought that its value as a work for daily reference would be enhanced by the addition of the excellent "Code of Ethics of the American Medical Association," which, adopted as it has been by most of the State Medical Societies, may be regarded as the standard guide of the American profession.

Philadelphia, October, 1856.

PREFACE.

THE following pages have been written with the intention of removing some of the difficulties which the student always—and the practitioner frequently—must encounter, while studying disease in its Protean forms at the bedside. Remembering my own impressions of bewilderment on beginning to "walk the hospital," I have honestly endeavored to simplify the task for others; and should this treatise be the means of doing so, I shall feel greatly rewarded for my exertions.

CHARLOTTE STREET, BEDFORD SQUARE,
February, 1855.

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CHAPTER I.

ON THE CLINICAL STUDY OF DISEASE.

SECTION 1. ON THE FACULTY OF OBSERVATION.

All who have studied the writings of the greatest of philosophers—Lord Bacon—must know that there are two especial sources to which he refers men for real increase of knowledge, namely, to observation and experiment, which he insists are but questionings of Nature in respect of specific matters. To cultivate the faculty of observation must then be the first duty of those who would excel in any scientific pursuit,[1] and to none is this study more necessary than to the student of medicine. To such an one it may be said, that the habit of correct observation is that mode of learning his profession which above all others he should most diligently cultivate; remembering that observation does not consist in the mere habitual sight of objects—in a kind of vague looking-on, so to speak—but in the power of comparing the known with the unknown, of contrasting the similar and dissimilar, in justly appreciating the connection between cause and effect, and in estimating at their correct value established facts. The great Newton has assured us that he knew of no difference between himself and other men but in his habits of observation and

[1] "L'art d'observer est le seul moyen d'acquérir des connaissances utiles."—La Croix.

attention, and almost the same encouraging remark was mad by Locke.

The constitution of the human mind is such that the acquisition of knowledge can only be very gradual. Just as there is no royal road to learning, so there is no rapid method of gaining experience; and he who wishes to excel must not only work assiduously, but must be careful that he toils in the right direction. Although at first the difficulties in the way of observing correctly may appear insurmountable, yet as the habit is daily encouraged will the path become clear, until at last what was at first a labor becomes a matter of almost routine practice.

The most important part of a medical man's education is undoubtedly to be gained at the bedside. In the wards of our various hospitals every diversity of ailment, every variety of injury may be carefully observed and investigated, first—as disease appears naturally, when, as we may say, Nature is performing her experiments for our wisdom; and secondly—as modified by a careful use of those remedial agents which have been so bountifully bestowed upon us. In order, however, that the observation of disease may be profitable, it must be complete. It will be useless unless the malady be watched during its whole course, the symptoms as they arise noted, and the effects of medicines carefully observed until the termination in recovery or death. Especially is the termination of a case instructive, and not the less so when the result is death, since we may then mark the way in which the patient succumbed, and learn to guard against such an event in similar examples for the future. Just as a man who wishes to become acquainted with the nature and characteristics of a foreign country may read a whole library on the subject, inspect charts and panoramic views faithfully drawn, or study a series of paintings delineating separately all that is most worthy of observation, and yet certainly fail to obtain any correct idea of the distant land; so may a student learn the entire practice of physic by heart from books, and yet be unable to distinguish small-pox from measles when called upon to put his theoretical knowledge into actual practice. Valuable, therefore, and indeed indispensable, as is the assistance to be derived from a careful study of the writings of the masters of our profession, yet these writings must be regarded principally, if not solely, as guide-books, that is to say, as intended to smooth the difficulties which the observer will have to encounter, but by no means calculated to do away with the labor of self-observation; for it is not too much to

say that without practical experience all other acquirements are of no avail to the practitioner of medicine. Truly excellent, then, is the advice given by Dr. Latham to the student, "begin by learning to stand by the sick-bed, and make it your delight." He who will be content to do this in a right spirit, may be assured of becoming an eminently useful member of the noblest profession that can engage the attention or encourage the development of the highest qualities of the mind of man: let him but work diligently, perseveringly, and conscientiously, and he may be certain of ultimately acquiring —if not the purse of Fortunatus—at least a competency; but, above all, will he experience that happiness which princes may envy, but which they cannot bestow, the gratification of knowing that—in however humble a degree—he is the honored instrument of "God, who healeth our diseases."

SECTION 2. THE GENERAL CONDUCT OF THE MEDICAL PRACTITIONER.

Although much might be advantageously written upon this subject, yet a very few words must suffice. The mere fact that the practice of medicine arose from an instinctive impulse to relieve the pains and sufferings of others is sufficient to show that the medical man, of all men, should be free from that vice which is the besetting sin of mankind—selfishness. He must, indeed, be thoroughly content to live, not for himself, but for others; not to look to his own interests, not to be guided in his actions by motives of policy, but to let the rule of his life be to do as much good to others as possible. He should think as little of pecuniary rewards as is compatible with his own interests and that of his brother practitioners, remembering the maxim adopted by La Bruyère from Confucius—that he who esteems gold more than virtue, will be likely to lose both gold and virtue. The physician, to be successful, must not only possess a sound practical knowledge of his profession, but he must also be careful that his moral character be free from blemish; that his general conduct be not only above vulgarity, but such as to excite the respect of his friends and neighbors; that he be conscientious, attentive, careful of the secrets of those who consult him, unmindful of the worldly condition of his patients, sympathizing, calm, and circumspect in his behavior generally. As it is his object to prolong life, so he must leave no means unpursued in order to attain such object, remembering that the mere prescribing of medicines is often the least part of his duty. It would

indeed be well if medical men generally thought more of the *moral* remedies at their disposal; and if more attention were bestowed upon soothing the fleeting moments of the afflicted, by inspiring them with hope, confidence, and ease of mind. A man who practises his profession conscientiously will never be unmindful of the duties which he owes to his colleagues—to those treading the same path as himself. He will carefully avoid all such short-sighted proceedings as may tend to elevate himself by depressing others; he will strictly eschew those disgraceful methods of obtaining notoriety, newspaper puffing or prescribing; and he will hesitate at giving, as a rule, gratuitous advice, where such is not needed by the circumstances of the patient, and where such a course of proceeding must injure those who are content to receive a small remuneration for their toilsome labors, and whose daily bread probably depends upon their obtaining such a return for their exertions.

The encouragement bestowed upon medical men is for the most part very deficient, their worth and usefulness being unacknowledged, their fatigues and anxieties unheeded, and their unselfishness and disregard of wealth abused. While striving to diminish the sufferings of their afflicted fellow-creatures, can it happen otherwise than that their feelings should be hurt by observing the attention paid to men practising the most palpable absurdities and deceptions, by witnessing the success of homœopaths, table-turners, mesmerists, and such like? Has it not, however, always been so? Does not Bacon himself tell us, that "the weakness and credulity of men is such, as they will often prefer a mountebank or witch before a learned physician,"[1] and is the present age less credulous than that of the great philosopher? I fear not! But it is the prerogative of superior minds to rise with the occasion. Let us, therefore, individually and collectively, as students and practitioners, strive to improve our art: let us each endeavor to attain that mental sagacity which will enable us to perceive the important features of cases coming under our care and the salient points of diagnosis; that wisdom which can foresee the course and progress of disease; that judgment which will enable us to select the proper remedies; and that calm determination which will render us capable of insisting that the necessary measures are thoroughly carried out.

[1] The Advancement of Learning.

SECTION 3. THE CLINICAL EXAMINATION OF A PATIENT.

Upon the application of a sick person to a medical man, the first object of the latter must be to ascertain the exact nature of the disease before him. As it often happens that the sufferer is embarrassed by the novelty of his situation and by general debility resulting from his malady, we must endeavor by calmness, delicacy, patience, and kindness on our part to put him at his ease, which will be readily done by one who has accustomed himself to intercourse with invalids. A few remarks on general subjects, inquiries as to his place of residence, and the length of time he has suffered from bad health, will enable the practitioner to learn much from—

An Examination of the Exterior, the physiognomy first engaging attention, since from it may be learnt the patient's apparent age, strength, state of mind, complexion—whether pale, florid, or dusky, and his general constitution. The general bulk of the body should then be cursorily examined, noticing whether it be large and full, or thin and wasted; the condition of particular regions, whether swelled or attenuated; the presence or absence of any cutaneous eruptions; and, lastly, evidence is to be obtained as to the powers of voluntary motion, as the use of the arms, of the legs in locomotion, &c.

Interrogation of the Patient.—We are now prepared to interrogate the patient himself, and this we do by inquiring whether he has any pain, where it is seated, and the length of time he has been ailing. This leads him to enter into a description of his sufferings, and of the means he has adopted for their relief; and although in many instances he may not make his statement the short simple narrative we might desire, yet, as a general rule, it will always be better to let him tell his own tale in his own fashion. Then, according as complaint is made of suffering in any particular organ, we proceed to investigate the condition of this and of all parts connected with it. Thus, suppose pain be complained of in the head, we proceed to make—

An Examination of the Cranium, as to its general form, symmetry of the two sides, special prominences and depressions, and heat of the integuments. Inquiries are then to be made as to the nature and duration of the pain, as to whether it is deep seated or superficial, affected by pressure, by noise; whether it is periodic, or connected with neuralgie or rheumatic pains in other parts of the body. We must ascertain, also, the presence or absence of vertigo; the condition of the

functions of sight and hearing; the ability or inability to sleep, to take exercise, and to make use of the mental faculties. Or, perhaps, the seat of disease may appear to be in the thorax. We then make—

An Examination of the Thoracic Viscera, resorting to inspection, palpation—or the application of the hand, mensuration, percussion, and auscultation, in the manner to be hereafter noticed. We then endeavor to ascertain the presence or absence of cough and its nature; the characters of the expectoration; the amount of facility or of difficulty of breathing, both when the body is quiet and when undergoing exertion; the nature of the heart's action, whether there be palpitation or no; and the presence or absence of such general symptoms as emaciation, purging, night-sweats, &c.

An Examination of the Abdomen, when any of the abdominal viscera appear affected, must be made by inspection, measurement, palpation, percussion, and auscultation. The boundaries of the liver, spleen, and stomach must be ascertained; the nature, duration, and seat of pain, if any; the presence or absence of tumors, and hernial protrusions; the condition and number of the alvine evacuations; the mode in which digestion is performed, and the state of the appetite; and the characters of the renal secretion.

Present General Condition of the Patient.—It then remains for us to endeavor to ascertain accurately the present condition of the patient, the state of his skin as to its temperature, &c., the condition of the tongue, and the nature of the pulse. His real age, profession, whether married or single, constitution, habits and mode of living, usual state of health, &c., are then to be inquired into, and we conclude by ascertaining the causes of the disease, whether it be hereditary or acquired, whether the present is the first attack or otherwise, and the ability of the sufferer to undergo the necessary treatment.

There are, of course, many circumstances which often prevent our making an examination in the exact manner just described. Thus, in many instances, we have to depend for much of our information on the testimony of relatives or friends, or we may even be called to a person who is quite insensible, and we may be unable to obtain any history at all. The educated practitioner, however, will be at no loss how best to proceed on such an emergency.[1]

[1] The student may advantageously refer to the "Mode of Interrogating a Patient," recommended by Dr. Spillan, in the introductory chapter of his Translation of Andral's "Clinique Medicale."

Examination of Female Patients.—In examining into the history of a female patient, we must proceed as just recommended, at the same time paying attention to the condition of the sexual system, ascertaining especially whether the patient is single, married, or widowed; the number of her pregnancies and of her children, and the date of her last labor; the manner in which the catamenial function is performed; and the presence or absence of any leucorrhœal or other discharge.

SECTION 4. THE CLINICAL EXAMINATION OF CHILDREN.

The importance of attending to the diseases of children cannot be too much insisted upon, especially seeing that so serious are their maladies, and so great is the mismanagement to which young children are often subjected, that it has been calculated one child in every five dies within a year of its birth, and one in three before the end of the fifth year; while of the deaths occurring within the first year, nearly one-third are said to take place before the end of the first month. Some authorities even estimate the mortality as higher than this. Thus, Dr. Friedlander asserts—"Il périt près du quart des enfans pendant la première année."[1] In many of the large manufacturing towns of England, the Registrar-General's Reports give a proportion of nearly one-fourth for the males and one-fifth for the females, under one year of age, out of the whole number of registered deaths.

In no case perhaps does the practitioner so much stand in need of a certain tact as investigating the disorders of childhood. As Dr. West justly says—"You try to gather information from the expression of his countenance, but the child is fretful, and will not bear to be looked at; you endeavor to feel his pulse, he struggles in alarm; you try to auscultate his chest, and he breaks out into a violent fit of crying."[2] But, by patience and good temper, by a quiet demeanor and a gentle voice, all may be made to go well, and a diagnosis may be formed almost as easily as in the case of adults. The first point is to be careful not to alarm the patient, but on entering the room to gain quietly the previous history of the case from the mother or nurse, the circumstances under which the present illness has come on, its early symptoms, the child's sex and age, the nature of its food, and whether it has been weaned, the state of the bowels, and the nature of the evacuations; while, at the same time, without appearing to do so, you exa-

[1] Education Physique des Enfans.
[2] West on the Diseases of Infancy and Childhood.

mine the expression of the countenance, the character of the inspirations and expirations, &c. By this time the little sufferer will have become accustomed to your presence, and you may advance to the bedside to examine it more closely. The temperature of the body and condition of the skin, the nature of the pulse, the state of the scalp and fontanelles, the presence or absence of abdominal pain or tenderness on pressure, may now be ascertained, and by a little management auscultation may be practised. It is worthy of remembrance that immediate auscultation is generally to be preferred in these cases, if possible, as the pressure of the stethoscope frightens, if it does not hurt the child. In practising percussion, care must be taken not to strike too smartly, the variations in resonance being more readily appreciated by a gentle stroke; it is almost unnecessary to say that mediate percussion must be employed, that is to say, the blow must fall on the finger, not on the chest walls. Lastly, the state of the tongue, the condition of the gums, and the number of the teeth, if any, remains to be ascertained, it being generally better to defer this to the last, since, as Dr. West observes, it is usually the most grievous part of your visit to the child.

SECTION 5. MODE OF TAKING NOTES OF A CASE.

It has long been a matter of regret that medical practitioners, generally, do not pay greater attention to recording systematic notes of their more important cases. Lord Bacon has well observed, in speaking of the deficiencies of physicians—"The first is the discontinuance of the ancient and serious diligence of Hippocrates, which used to set down a narrative of the special cases of his patients, and how they proceeded, and how they were judged by recovery or death."[1] Such narratives, carefully arranged, not only prove of inestimable value to the practitioner himself, but they forward the progress of the healing art, and especially tend to increase our knowledge of diagnosis and therapeutics.

In taking these notes, it is especially necessary to do so methodically. The following plan will probably be found as simple and useful as any:—

General Observations.—Name; age; married or single; if a female, number of children and date of last birth; date of coming under treatment.

Anatomical or Physical Peculiarities.—Development

[1] Advancement of Learning, Book ii. Narrationes medicinales.

of trunk and limbs; deformities; height; weight; countenance; eruptions on skin, their form and nature; nervous excitability; disposition to sleep; habitual state of bowels.

Intellectual and Moral Peculiarities.—Education; memory; judgment; reasoning powers; behavior; disposition; religious feelings, &c.

Previous History.—Place of birth; condition in life, and health of parents; health of brothers and sisters; family diseases; present residence, and how long resident there; occupation; mode of living, appetite, and habits, whether temperate or otherwise; habitual use of medicines, and their nature, as narcotics, purgatives, &c.,; peculiar habits; venereal indulgences.

Previous General Health.—Habitual health and strength; former illnesses, their nature and duration; liability to colds, coughs, fevers, fits, rheumatism, gout, hemorrhages from nose or mouth, hernia. If a female, age at which catamenia first appeared; nature and duration of the flow; whether regular or otherwise; date of last period; leucorrhœal or other discharges; number of children or abortions; character of labors; suckled her children or not.

Present Illness.—Date and mode of commencement, whether sudden or gradual; symptoms complained of, with date of accession and progress of each up to the present time; medical treatment to which patient has been subjected; result of such treatment.

Present Condition.—Aspect and complexion; state of nutrition; state of strength; fever; sensation of cold; shivering; skin harsh and dry, or moist; disposition to be anxious and depressed, or hopeful.

Condition of Nervous System.—Pain of head, or giddiness; pain on pressure; pain over any part of spinal column; impairment of sensibility or motion, in face, tongue, sphincters, extremities; power of mastication and deglutition; intellect; memory; senses; capacity for mental exertion; sleep, tranquil or disturbed.

Condition of Organs of Respiration and Circulation.—Number and character of respirations and pulse; cough; expectoration; voice; pain of chest; decubitus; size and form of chest; relative size of the two sides; examination of the expansive movements of the chest; examination of the lungs by the spirometer, by palpation or the application of the hand, by percussion and auscultation. Phenomena of the cir-

culation—palpitation; percussion and auscultation of the heart; point at which the apex is felt; impulse; auscultation of the carotids, and other arteries; state of the veins; effect of change of posture on the pulse.

Condition of Digestive Organs.—Appearance of mouth, tongue, fauces, tonsils, and pharynx; thirst; appetite; nausea or vomiting; character of vomited matters; bowels, frequency of defecation, and character of evacuations; pain or tenderness of abdomen; results of manual examination; boundaries of liver and spleen; auscultation; tumors; hernial protrusions; hemorrhoids.

Condition of Urinary Organs.—Micturition easy, frequent or otherwise; character of urinary secretion, quantity in twenty-four hours, color, odor, transparency, reaction with litmus and turmeric papers, specific gravity, results of the employment of reagents, nature of pellicle or of deposits—if any; miscroscopical examination.

Causes of Illness.—Assigned cause; probable cause; duration of.

Diagnosis.

Prognosis.

General Rules of Treatment.—Regimen; diet; prescription.

At each subsequent visit the progress of the case must be commented on, the effect of the remedies employed noticed, and at the conclusion the interesting points should be summed up in a few brief remarks.

Should the case terminate fatally, a post-mortem examination must be made in the manner to be presently described.

SECTION 6. MODE OF TAKING NOTES OF DISEASES OF FEMALES.

The following is the plan adopted by myself at the Hospital for Women. It is necessarily short, but by a little management all the important features of the case can be recorded, and they are at all times seen at a glance.

Date. No. of ward and bed.
Disease.
Name and address.
Age; single, married, or widowed. Date of marriage.
No. of pregnancies. No. of children.
Date, and character of last labor.

Condition of life and general habits.
Catamenia—nature and duration of flow; age at first appearance; date of last.
Leucorrhœal or other discharges.
History; health of relations, &c.
Date of present illness.
Causes.
Symptoms.
Condition of nervous system.
Condition of organs of respiration and circulation.
Organs of digestion.
Urinary organs, and secretion.
Examination per abdomen.
Examination per vaginam; by the touch; by the speculum; by the uterine sound.
Examination per rectum.
Progress, treatment, and termination.

SECTION 7. MODE OF MAKING A POST-MORTEM EXAMINATION.

At a period varying from twelve to thirty six, or even—in cold weather—to forty-eight hours after death, the post-mortem examination may be made.

Having carefully examined the external appearance of the body,

The Skull is to be thus opened:—separate the hair, and make an incision through the scalp from one ear across the vertex to the other; reflect the anterior flap over the face, the posterior over the neck. Then with a saw make a cut through the outer table of the bones of the skull, completely round the cranium, passing the saw anteriorly about an inch above the superciliary arches, posteriorly just below the tubercle of the occipital bone, and on each side on a level with the cartilage of the ear. Introduce the elevator or chisel, and by means of a few smart strokes with the hammer, the inner table will be readily fractured, and the calvarium may be then torn away. The dura mater, the most external of the membranes of the brain, being thus exposed, it must be cut through with a scissors on either side—and in the direction of—the superior longitudinal sinus; divide the falx cerebri; and elevating the head by means of a block or tripod, proceed to remove the brain, by gently raising it with the fingers placed under the anterior lobes and olfactory bulbs. The internal carotid artery, and second and third nerves, which first present them-

selves, are then to be divided; the pituitary body to be dislodged from the hollow in the centre of the sphenoid bone; and an incision is to be made through the fourth nerve, and the tentorium cerebelli close to its attachment to the temporal bone. We then successively perceive, and must divide, the two roots of the fifth nerve, the sixth, the seventh with its facial and auditory portions, the three divisions of the eighth—the glosso-pharyngeal, pneumogastric, and spinal accessory,—and the ninth nerve. Lastly, we cut across the vertebral arteries as they wind round the upper portion of the spinal cord, and then, as low as possible, divide the cord itself, with the roots of the spinal nerves attached on each side. The brain may now be readily taken from the skull, and carefully examined, by slicing it in thin layers in the horizontal direction, from above downwards. The vascularity of the gray and white portions, the quantity of fluid in the ventricles, and the condition of the cerebral arteries must be noticed. To judge of its consistence, a fine stream of water should be poured from a height on the different parts, as they are successively exposed.

The Spinal Cord is to be exposed by sawing through the arches of the vertebræ on each side, close to the articular processes, after the skin and muscles have been divided down to the bones. In some parts—as in the hollow of the lumbar region—difficulty will be experienced in using the saw; a chisel and hammer will then be found useful. When the spinal canal is opened, the strong tube of the dura mater prolonged from that lining the skull will be exposed; this is to be slit up, and the cord, examined *in situ*, at the same time observing the quantity of fluid in the spinal canal, and the condition of the spinal veins. Subsequently divide the anterior and posterior roots of the thirty-one spinal nerves, and remove the cord for a closer inspection.

The Thoracic and Abdominal Cavities.—For the purpose of examining the morbid appearances presented by the thoracic and abdominal viscera, we open the cavities containing them at the same time, by making a straight incision from the thyroid cartilage of the larynx down to the symphysis pubis. Dividing the integuments, muscles, and peritoneum, we open the abdomen, the contents of which may be more readily exposed by making, in addition, a transverse *subcutaneous* incision on each side, through the fascia, muscles, and peritoneum; then dissecting back the skin and muscles covering the front of the thorax, we expose the cartilages connecting the ribs with the sternum. The cartilages are then to be

cut through at their junction with the ribs, except those of the first ribs; and the sternum may now be raised like the lid of a box, a good substitute for a hinge being made by cutting the articulation of the first joint of the sternum on the inside.

In inspecting the trachea and bronchi, they should be opened along their anterior surface. To show the valves of the heart, the right ventricle must be opened by a V-shaped flap, made by an incision immediately to the right of the septum, meeting at the apex another, carried along the right edge of the heart. Before laying open the pulmonary artery, the finger should be introduced, so as to guide the incision between the valves. The left ventricle should be opened by an incision in the direction of the aorta, beginning at the apex, a little to the left of the septum, having previously dissected the pulmonary artery off from the aorta, and taking care to use the same precaution against injuring the valves as in opening the pulmonary artery.

The Urinary and Generative Organs may be readily removed from the body for examination through the pelvis, and if the integuments in the perineum be left uninjured, and the several outlets stitched up, any portion presenting diseased appearances may be taken away without disfiguring the body, and without any of the contents of the abdomen protruding. With regard to the remaining viscera, no special directions seem necessary as to the mode of preparing them for inspection.

SECTION 8. MODE OF TAKING NOTES OF A POST-MORTEM EXAMINATION.

As it is of course requisite that the details of the morbid appearance should be strictly accurate, the notes should be taken at the time of making the autopsy. The following arrangement may be adopted:—

General Observations.—Name; age; day and hour of death; day and hour of examination; temperature to which the body has been exposed; degree in which external sexual characters are marked, mammæ, mons veneris, &c.; state of nutrition; eruptions; peculiarities of formation, or deformities; œdema of face, limbs, or trunk; marks of violence, contusions, wounds; degree of rigor mortis; and the presence or absence of any marks of putrefaction.

Examination of Head, Face, Mouth, and Fauces.—Bones of the head; fractures and their seat; adhesions of

calvarium to dura mater; characters of dura mater, arachnoid, and pia mater; Pacchionian glands; quantity and character of the sub-arachnoid fluid. Weight of brain; weight of cerebrum, pons Varolii, medulla oblongata, and cerebellum. Convolutions of the brain, their appearance and consistence. White and gray substance of hemispheres: consistence—whether natural, increased, diminished,—soft, creamy, diffluent; color of cut surface; number and size of red points. Extravasation of blood; situation; quantity. Unnatural cavities in cerebral substance; situation; contents; linings; state of surrounding brain substance. Tubercular, calcareous, or malignant deposits. Lateral ventricles; contents—color and quantity of fluid; condition of choroid plexus. Third ventricle; contents. Optic thalami and corpora striata. Pons Varolii. Medulla oblongata. Cerebellum; form; firmness; color; appearances on section. Face; lips; cavity of mouth, contents—food or foreign substances; teeth, whether recently fractured; tongue—size, form papillæ, if stained or corroded. Fauces; tonsils; pharynx, contents of, nature of; œsophagus, dilated or constricted; epiglottis, rima glottidis.

Examination of Thorax.—Trachea; bronchial tubes. Pleuræ; nature and quantity of fluids effused into pleura. sacs; adhesions. Lungs; external characters; degree of collapse; puckering at any part; cicatrices; emphysema; deposits of tubercle, of cancer; hydrostatic test, whether the lungs sink or float, result with various portions; substance of lungs, consistence, exudation of serum on section; crepitation; abscess; gangrene; pulmonary apoplexy; tubercles, their seat and condition; cavities, their seat, size, form, contents, and if communicating with bronchial tubes; cysts; deposits of cancer. Pericardium; adhesions; effusions; white spots, their size, shape, and situation. Heart; weight; size; quantity of blood contained in various cavities, and its condition, frothy, liquid, or coagulated; thickness of walls; size of cavities, right auricle and ventricle, left auricle and ventricle; condition of musculi pectinati, columnæ carneæ, chordæ tendineæ; condition of foramen ovale; auriculo-ventricular openings—tricuspid valve, bicuspid or mitral valve; aperture of pulmonary artery, semilunar valves, and corpora Arantii; aortic orifice, valves, and corpora Arantii. Coronary arteries, their condition. Microscopical examination of muscular fibres of heart.

Examination of Abdomen.—Peritoneum; condition; contents; parts through which herniæ have passed. Liver; external characters, form, measurement, weight, color, condi-

tion of capsule; substance, cut surface, color, degree of fat, deposits of tubercle, of cancer; cysts; gangrene; microscopical examination. Gall-bladder; size; shape; contents; calculi; ductus communis choledochus. Spleen; position; size; weight; capsule; substance. Pancreas; position; weight; substance; color; duct. Kidneys; external characters; capsule; surface after removal, if lobulated, granulated; cut surface; cortical substance; pyramidal portion; pelvis of kidney; ureters; microscopical examination. Urinary bladder; contents; walls. Stomach; position; size; form; contents; condition of mucous membrane; rugæ; cardiac orifice; pyloric orifice; walls of; cicatrices; ulcers; perforations; wounds. Abnormal condition of intestines generally; cicatrices; ulcers; wounds; perforations. Duodenum; Brunner's glands; ductus communis. Jejunum and ileum; valvulæ conniventes; villi; Peyer's patches; glandulæ solitariæ. Cæcum; appendix vermiformis; ileo-cæcal valve; ileo-colic valve. Colon; glandulæ solitariæ. Rectum; hemorrhoids; prolapsus.

Examination of Male Organs of Generation.—Inguinal canal; vasa deferentia; spermatic cord; tunica vaginalis; testes; penis; prostate gland.

Examination of Female Organs of Generation.—Labia; nymphæ; clitoris; urethra; hymen; vagina; uterus —lips, size of cavity, thickness of walls; Fallopian tubes; ovaries; pelvic tumors.

Examination of Spinal Cord; vertebral canal; theca vertebralis; size and consistence of cord, cervical and lumbar enlargements, gray and white substance; roots of nerves; cauda equina.

SECTION 9. THE CLINICAL EXAMINATION OF THE INSANE.

The clinical examination of a man supposed to be insane differs very materially from that adopted in the diagnosis of corporeal diseases. To inquire of a lunatic of what he complains—or where he suffers pain—or how long he has been ill?—is in the majority of cases useless; since he will only reply that he has no pain, that he is quite well, and that he wishes to know by what authority you venture to question him. Neither does the appearance of the tongue, the nature of the pulse, nor the character of the secretions afford us any valuable indications; but we are obliged to rely upon the informa-

tion gained from a close examination of the physiognomy actions, conversation, powers of memory, &c. The state of the general health is, however, by no means to be neglected, since, as is well known, the body affects but too closely the state of the mental faculties:—want of vitality and of nervous tone, deficient healthy action of the skin and internal organs, and torpidity of the primæ viæ, are, moreover, exceedingly common in the insane.

The difficulties experienced in the diagnosis of insanity will, of course, depend upon the degree in which the mental faculties are lost. The complete maniac lives in a waking dream; he raves without the power to control himself, without the power of appreciating the necessity for doing so; he is completely the victim, not in the least the master, of the strongest impressions uppermost in his fancy. The partially insane person, on the other hand, will restrain himself, though probably with a great effort, on occasions when he thinks such restraint advisable, as before strangers, &c. The majority of insane people—especially chronic cases—are able by a greater or less degree of exertion to restrain their insane impulses on occasions, and they do so. Consequently, we must draw our conclusions not merely from the evidence derived from the nature of the countenance, or of the actions, or of the conversation, but from our entire—and, if necessary, frequent and unsuspected—examination of the patient.[1]

Investigation of the Physiognomy.—To appreciate correctly the inferences to be drawn from this examination, the eye must be practised by long-continued observation not only of the insane, but of the varieties of expression which indicate the growth, normal state, and decline of mental vigor. We should be familiar with the cheerful open countenance of the man in the enjoyment of mental and bodily health and ease, with the vacant stare of the thoughtless, the melancholy visage of the disappointed, the dreamy look of the absent man, and with the wildness of expression of the maniac; we shall then be able justly to estimate the evidence written upon the forehead, the expressive language spoken by the eyes—the mirror of the mind, and the inward restlessness betokened by the constant play of the muscles around the mouth. The more closely these appearances have been observed, the more readily will the peculiar manifestations of insanity be recognized.

Investigation of the Actions.—From examining the

[1] See Remarks on Insanity, by Dr. Henry Monro.

face, we shall proceed naturally to observe the attitudes, gestures, movements, and general conduct. The facility, suppleness, and co-ordination of the movements must be noticed. The attitude of the old man with his head inclined to his chest, his back bent, and his knees giving way under him, is not more characteristic of a state of senility and exhaustion, than is the position of an unfortunate human being seated on the floor, with his chin resting on his knees, motionless for hours, and entirely unmindful of all that is passing around, indicative of incurable dementia. The gestures alone often indicate the passion which predominates. In insanity from disappointed love, airs of languor are often affected ; in that from religion, great humility and attention ; in that from sexual excesses, a downcast appearance, an evident desire to avoid notice, and an inability to look one in the face. The various gestures and actions of the insane, however, from the happy easy movements of the man who believes himself a monarch, or the excited violent ravings of one suffering from acute mania, to the sad torpid listlessness of the incurably demented, require to be drawn in stronger colors than I have the art of employing, in order to produce truthful portraits.

The Conversation of the Insane.—In endeavoring to gain information from this source, we must first seek to obtain, by kindness and a sympathizing manner, the confidence of the patient ; for since it will frequently be necessary to ascertain his thoughts on the most varied subjects, so—unless we do so—and succeed in interesting him, he will often become suspicious of our motives, sullen, and uncommunicative. Lord Erskine, in his defence of Hadfield, referred to the case of a lunatic from whom he could draw no indication of insanity in the course of an examination in a court of law, until Dr. Sims entered, when the man addressed him as the Lord and Saviour of mankind. In many cases of madness, the reasoning faculties not being wholly lost, we are not surprised at finding that the patient can discourse correctly on many topics, until some accidental observation leads him to break out into the most imbecile extravagance, or makes him confide to us plans of revenge, or proposals for performing the most impracticable achievements.

The Memory of the Insane.—Evidence may generally be obtained more easily upon this point than upon most others. A few quiet questions addressed to the patient as to his name, age, and address, the members of his family, the nature of his occupation, the day of the week, the name of the reigning

monarch, &c., will often suffice; or where there is evidently mental weakness, we may ask him to shut his left eye, give his left hand, put out his tongue, show his right leg, and so on. An examination of the letters written by such an one will often also give us information upon this head, while they at the same time teach us his intimate thoughts. These letters are often rambling and incoherent, and a very frequent characteristic of them is that they are full of wants. The following copy of a paper given to Dr. Conolly, by one who said that he had "received a commission from God Almighty," is a good example of this:—"In the name of the most High, Eternal, Almighty God of Heaven, Earth, and Space—I command you to procure me the following articles immediately:—a Holy Bible, with engravings, &c., a Concordance, a Martyrology, with plates. Some other religious books. A late Geographical Grammar, a Modern Gazetteer, Newspapers, Magazines, Almanacs, &c., of any kind or date. Musical instruments and Music; Large Plans, Maps, Guides, Directories, and Histories of Edinburgh, Glasgow, London, Dublin, Paris, Rome, Naples, &c.; Histories of Rob Roy; Riley's Itinerary, and his other works. Histories and Memoirs of George the Third, Queen Charlotte, Princess of Wales, Princess Charlotte of Wales, the Regent and Court, Prince Cobourg, Marquis of Hastings, Lords Sidmouth, Castlereagh, Bonaparte, the Beast, &c. Wines, fruit, lozenges, tobacco, snuff, oysters, money, everything fitting to Almighty God. Answer this in three days or you go to hell. P. S.—A portable desk and stationery, and a dressing case."

In connection with this subject it remains to say that the practitioner should, as a rule, be introduced to the patient in his proper character, and that he should bear in mind that the object of his examination is not only to determine whether the individual is of unsound mind, but if so, the treatment that must be adopted, especially with reference to the necessity for restraint, and the degree to which it may be called for. Should the circumstances require him to give

A Certificate of Insanity, he must remember the stringent rules with respect to it, enforced by the Act of Parliament, which came into operation on the 4th of August, 1845. According to Section 45, no person (not a pauper) can be received into or detained in any licensed house or asylum, without an order from some responsible person, and two medical certificates, which must be signed by two physicians, surgeons, or apothecaries, not in partnership, and having no interest

directly or indirectly in the house or hospital in which the patient is to be confined. They must each separately examine the alleged lunatic, not more than seven days prior to his reception into the asylum; and they must severally sign and date the certificate on the day of examination, and state the facts on which they form their opinion. The following is the form of certificate in the case of a private patient:—

I being a (1) hereby certify that I have this day, separately from any other medical practitioner, visited and personally examined the person named in the accompanying statement and order, and that the said is a (2) and a proper person to be confined, and that I have formed this opinion from the following fact (3) viz.:—

Signed, Name.
Place of abode.
Dated this day of one thousand eight hundred and

Medical Case-book.—In the same Act of Parliament a section has been introduced requiring that a medical case-book shall be kept in every asylum throughout the kingdom, in which the history, treatment, &c., of all patients shall be from time to time recorded. The following is the plan adopted by Dr. Stevens, at St. Luke's Hospital for Lunatics:—

Name? Age?
Married, single, or widowed?
Number of children? Age of youngest?
Occupation?
Residence? Where born?
Religion? Disposition?
Duration of existing attacks?
Whether first attack? Age on first attack?
Previous place of confinement?
Date of previous admission? And discharge?
Cause? { Moral? / Physical?
Hereditary?
Disease of children?
Habits? Degree of education?
Complexion? Hair? Eyes?
Natural affection perverted or not? How?
Temperament?

1 Physician, surgeon, or apothecary, duly authorized to practise as such.
2 Lunatic, or insane person, or an idiot, or a person of unsound mind.
3 Or facts.

Evidences of insanity?
Form of insanity?
Dangerous to self or others?
Certificates?
Previous treatment?
State of bodily health?
Any injuries from violence?
Admitted on day of into gallery?
Progress, treatment, and result?

SECTION 10. EXAMINATION OF PERSONS FOR LIFE ASSURANCE.

The knowledge required by a medical man in "the life office" is somewhat different from that necessary in the private consulting-room. In the latter the patient is full of complaints, anxious to acknowledge all the pains and symptoms of disease which he may be suffering from, and ready to communicate the cause and history of his malady; in the former he generally acknowledges no uneasiness, and does his best to appear constitutionally strong and free from disease. In the consulting-room no information is withheld, and it is only necessary for the practitioner to weigh the value of the evidence laid before him, reject that which is worthless, and act upon that which is to be relied on; in the assurance office the tendency is to withhold and keep back everything which the assurer may deem calculated to make his life appear bad. The duty of the medical officer, consequently, resolves itself into looking out for and detecting any hidden diseases, malformations, or conditions which may threaten to shorten or endanger life; as well as to observe upon the effects of any previous disorders which may have tended to vitiate the constitution.

In most life offices the medical officer is required to fill up a printed form of questions, which in many instances is unnecessarily long and complicated. Indeed, it would be much better for every office to select their physicians and surgeons with care, and then be guided implicitly by their advice, without also rendering it necessary for the practitioner to submit to the directors the evidence upon which he founds his conclusions. The points to which the medical man should chiefly direct his attention are these:

1. The age, apparent age, occupation—and exposures attending it, and general appearance.

2. The family history, especially as regards scrofula, phthisis, insanity, gout, apoplexy, epilepsy, and renal diseases, occurring either in father, mother, brothers, or sisters.

3. Illnesses gone through since childhood, especially as regards small-pox and vaccination, gout, rheumatism, spitting of blood, asthma, pulmonary complaints, and fits of any kind.

4. The general habits and mode of living, inquiring as to the employment of exercise, early hours, and the use of intoxicating drinks, opium-eating, &c.

5. The character of the pulse and respirations.

6. The height, weight, and vital capacity—as ascertained by the spirometer.

When an examination has been made in the above order, the practitioner must proceed or not to make further investigations as he may deem necessary, and in the manner his judgment will suggest. In deciding upon a life, the recollection of the following aphorisms may lead to a correct decision.

If in doubt about the propriety of accepting a certain life, consider whether it would be advisable for the office to have one hundred such cases on its books.

Paucity of evidence in the family history must lead to increased care in the personal examination of the applicant.

Decline the life of a person who is not sober. Even if he has been given to drinking, and has reformed two or three years, yet his life should be declined, since permanent reformation is so very rare.

Tavern-keepers and such like, must be most carefully examined.

When there is consumption in the parents, decline the case.

The parents being well, but two or three of the brothers or sisters having died from phthisis, the life may be accepted, provided the applicant be strong and healthy, of proper weight and vital capacity, and of good habits. Should there be any flaw in the weight or vital capacity, decline.

If a man has had hæmoptysis, decline.

If a woman has had hæmoptysis, especially in early life, we may accept after a careful examination.

If a man or woman be above the normal weight, and the weight be rapidly increasing, decline; since such a person is quickly making fat, and may convert tissues whose integrity is necessary to life into the same material; especially in such is there a tendency to apoplexy, fatty degeneration of the arteries of the brain being often a cause of this disease.

Look with suspicion upon an applicant who has fatty degeneration of the margin of the cornea (areus senilis), since a

similar change may be taking place in the muscular fibres of the heart, or in the cerebral vessels.

Where there is any hereditary tendency to insanity, be very careful in the examination; if the life be accepted, it should only be at an increased premium.

It is almost unnecessary to add, in conclusion, that an epileptic, or one who has had a fit of apoplexy—however slight, or one affected with paralysis—however partial, can never be accepted.

SECTION 11. ON MEDICO-LEGAL INVESTIGATIONS.

In addition to the duties which every medical man owes to the public individually in his capacity of a practitioner, there are no less important obligations due from him to society at large. He is therefore often called upon not only to save life when it has been threatened by violence, the use of poisons, &c., but also to give evidence, in courts of law, touching such cases, in order that crimes against the person may be discouraged by the detection and punishment of those who practise them.

Use of Notes.—In the examination of such cases, it is advisable that notes be made at the time of all the particulars, whether they appear important or not, noting the time at which the person was first seen, the hour, day of the week, and day of the month being invariably mentioned, the period of the occurrence of death, as well as the circumstances under which the practitioner was summoned. The words, yesterday, next day, and similar vague expressions, should never be employed in such records, as they cause great inconvenience if referred to at a trial, and render a reference to almanacs necessary. It is also indispensably necessary that the notes should be taken on the spot at the time the observations are made, or as soon afterwards as possible, otherwise, they are not admissible as evidence. There is another rule which it is essential to remember. The notes may have been made on the spot in the manner required by law; but when a witness is about to refer to them in a court of justice, he will often be asked whether he is using them for the purpose of refreshing his memory, or whether he is about to speak only from what is written on the paper, without having any precise recollection on the subject. If for the latter purpose, the evidence is inadmissible, for it has been held by our judges that notes can only be used in evidence for the purpose of refreshing the memory on a fact indistinctly remembered; they are, in other

words, allowed to assist recollection, not to convey information.

Confessions and Death-bed Declarations.—It not unfrequently happens that the medical man is called upon by the sufferer to receive a confession. He must be careful, in doing so, to hold out no promise or threat of any kind. He should receive it without comment, write it down at the time, read it over to the person making it, obtain his signature to it, and countersign it himself.[1] The same rules apply to all death-bed declarations, which, it must be remembered, will only be subsequently admissible as legal evidence, when the parties making them were satisfied that recovery was impossible.

Reports for Judicial Purposes.—In drawing up a report of the symptoms, post-mortem appearances, and results of a chemical analysis, the facts should be in the first instance plainly stated in language free from technical terms, and easily intelligible to non-professional persons, any display of erudition being misplaced. In recording facts also, a reporter should not encumber his statements with opinions and inferences, but should reserve his conclusions until the end of the report. The language in which these conclusions are couched must be precise and clear, and should form a concise summary of the whole report, upon which the judgment of a magistrate or the decision of a coroner's jury may be ultimately based. They should be strictly kept to the matters under inquiry, and ought commonly to refer to the following questions:—What was the cause of death? What are the medical circumstances leading to a supposition that death was not due to natural disease? What are the circumstances leading to a supposition that death was caused by violence, by poisons, &c. It must be remembered, also, that the conclusions are to be founded only upon medical facts, and upon what the reporter has himself seen; a conclusion based upon mere probabilities is of no value as evidence.

In performing a post-mortem examination, a note must be made of the time after death at which it was made. The external appearances of the body are then to be observed, noting whether the surface be livid or pallid, the state of the countenance, and the presence or absence or marks of violence on the person; also, whether the rigor mortis has gone off, as well as the presence or absence of warmth in the extremities, or in the abdomen. The state of all the internal organs must then be remarked, especially the condition of the abdominal

[1] See Dr. Guy's Forensic Medicine.

viscera. If the stomach and intestines be found inflamed, the seat of inflammation should be exactly specified; also all marks of softening, ulceration, effusion of blood, corrosion, or perforation. The stomach must be removed and placed in a separate vessel, with its contents, a ligature being previously applied to the cardiac and pyloric orifices. The state of the thoracic viscera, of the brain, and of the spinal marrow, as well as of the genital organs, should be examined.

Occasionally the inspection is required to be made some time after interment. So long as the coffin remains entire, the expectation of discovering certain kinds of mineral poison in particular organs may be entertained; although decomposition may have advanced so as to destroy all pathological evidence. The inspection in such cases is commonly confined to the abdominal viscera, especially to the stomach, liver, and spleen, which should be taken from the body, and immediately sealed up in clean glass or porcelain vessels, and so kept for analysis.

In drawing up a report on the results of a chemical analysis, the following rules should be borne in mind: 1st. When, how, and from whom, the liquid or solid reserved for analysis was received; its state, whether secured in any way or exposed; whether labelled or not; and the kind of vessel containing it. 2d. Where and when the analysis was made; whether with or without the assistance of a second person; and where the substance was kept during the intermediate period. 3d. The physical characters of the substance; the processes and tests employed for determining whether it contained poison, not detailing all the steps, but giving a general outline of the analysis; together with the strength of the poison, the quantity present, and whether it could be produced or exist naturally within the body. And 4th. What quantity of the poison discovered would suffice to destroy life; and to what extent the dose might be modified by age or disease.

There are but few reports in which answers to these questions will not be required; and unless the whole of them be borne in mind at the time an analysis is undertaken, those which are then omitted can never be subsequently answered with satisfaction. The results of analysis, in the shape of sublimates or precipitates should be preserved as evidence, in small glass tubes hermetically sealed and labelled, so that they may be produced at the inquest or trial.

In many medico-legal inquiries, we shall derive invaluable assistance from the use of the microscope, as in diagnosing blood-stains from discolorations produced by red fluids, human

hair from that of animals, as well as in discovering spermatozoa in cases of rape. Should we resort to the employment of this instrument, drawings must be made—by the aid of the camera lucida—of the appearances found.

Medical Evidence at Inquests.—In giving evidence before the coroner, the medical man should be as careful as if in one of the superior law courts; it being necessary to remember that all he says is taken down by the coroner, and that if the case be sent for trial, such depositions will be in the hands of both judge and counsel. Should there consequently be any discrepancy in the practitioner's evidence, he will subject himself to severe censure.

CHAPTER II.

ON THE INSTRUMENTS EMPLOYED IN THE DIAGNOSIS OF DISEASE.

SECTION 1. THE MICROSCOPE.

It is certainly not asserting too much to say that the microscope[1] is an instrument of paramount importance to the medical practitioner of the present day. From having been formerly used as a toy, it has now been rendered one of the most important aids to scientific research, not more in natural history than in physiology and pathology: and I know not the way in which any other instrument can be substituted for it in the diagnosis of many diseases, especially perhaps those depending on the fatty degeneration of tissues, abnormal states of the blood, and diseased conditions of the renal secretion.

The chief obstacle to the more frequent use of the microscope is to be found in its expense; it not being generally known that with a cheap instrument, such as may now be obtained for six or eight pounds from many makers (Pillischer, Highley, Smith and Beck, and Salmon), under the name of *the student's microscope*, almost all may be accomplished that the practitioner need desire. Dr. Lionel Beale, in his "Treatise on the Microscope," well describes these instruments, and speaks highly of their utility. From my own observation, I can especially recommend Pillischer's student's microscope, which can be obtained complete for about £12.

Microscopes are of two kinds, the simple and the compound.

[1] Μικρος, small, and σκοπέω, to view.

The Simple Microscopes are of two sorts, namely, those held in the hand, and those mounted on a stand; the latter have a stage for holding the object to be viewed, a mirror for reflecting the light through transparent objects, and a condenser for throwing light on such as are opaque. The microscopes held in the hand consist, for the most part, of double convex or plano-convex lenses, mounted in tortoiseshell frames, and varying in focal length from the quarter of an inch to two inches; or they may be formed of a sphere of glass, round the equator of which a groove has been cut, which has been subsequently filled up with opaque matter, and then set in German silver, forming the Coddington lens; or they may consist of a double convex lens, with one convex surface greater than the other, which form, placed in a silver frame, is known as the Stanhope lens. Either of these glasses will be found useful pocket companions, and when mounted on a small stand, such as is used by the watchmakers and engravers, may be employed for dissecting the coarser tissues. There are many other different forms of simple microscope, which of course are made to suit the fancy of each optician. They are all useful, and many of them are constructed very ingeniously so as to form a box, or to fold up into the size of an octavo volume, by which contrivances greater portability is secured.

The Compound Microscope.—This instrument differs from a simple microscope, inasmuch as the image of an object formed by the object-glass is further magnified by one or more lenses forming an eye-piece; or, in other words, the rays of light from an object being brought into a new focus, there form an image, which image being treated as an original object by the eye-piece, is magnified in the same way as the simple microscope magnified the object itself.[1] A compound microscope consists of two essential parts: the stand—including a tube for carrying the optical apparatus and the stage; and the optical apparatus itself—consisting of the object-glasses or magnifying powers, the eye-pieces, and the mirror. In choosing a microscope, one of the great requisites in the *stand* is steadiness—although a large instrument is by no means necessary; the *tube* should allow of being moved by a coarse and fine motion, to permit of accurate focal adjustment; and the *stage* should be freely movable in two directions, at right angles to each other, either by screws, or by the rack and pinion. The *object-glasses*

[1] See Quekett on the Microscope, 2d edition, p. 67.

usually supplied with the best and most expensive instruments are either six or seven in number, and vary in their magnifying power from 20 to 2500 diameters; they are called two inch, one inch, half inch, one-quarter, one-eighth, one-twelfth, and one sixteenth; "but it must be understood that these names are not derived from the distance the bottom-glass of each combination is from the object, but from a fact found in practice, that a thin single lens, to magnify the same number of diameters as any of the preceding achromatic combinations, would be required to be of the same focal distance as that given to the others by name. In other words, if a single-lens were made the object-glass of a compound microscope, and if it were necessary to employ a power equal to that of the one-fourth achromatic combination, with the same compound body, it would be found that a thin single lens of one-quarter of an inch focus would be required to give that power." (Quekett, op. cit.) The *eye-pieces* furnished with the compound microscopes are made on the Huyghenian principle, and are three in number; they are generally marked from the lowest to the highest, A, B, C.

In estimating the magnifying power of a glass, we do so by the measure termed *linear*. Thus, if a cube be magnified ten times, we say that it is magnified ten times in diameter; but since it is magnified ten times in breadth as well as in length, some persons, to excite the astonishment of the vulgar, give the *superficial* magnifying power, and by squaring the linear would assert that the cube was magnified one hundred times ($10 \times 10 = 100$). Such a mode of expression is not countenanced by men of science.

The best microscopes at the present time are those made by Ross, Smith and Beck, and Powell and Lealand, at a cost, varying according to the number of object-glasses and apparatus, from twenty-five to fifty or 60 pounds. The magnifying powers obtained with the different eye-pieces and object-glasses of these makers are shown in the following tables:

MR. ROSS.

Eye-pieces.	OBJECT-GLASSES.					
	2-in.	1-in.	½ in.	¼-in.	⅛-in.	$\frac{1}{12}$-in.
A	20	60	100	220	420	600
B	30	80	130	350	670	870
C	40	100	180	500	900	1400

MESSRS. SMITH AND BECK.					
Focal Length.	LINEAR MAGNIFYING POWER, NEARLY. With Eye-piece.	1	2	3	Angle of Aperture about
	Draw tube closed, . .	20	45	80	13 deg.
1½-inch	Add for each inch of tube, drawn out, ...	4	6	8	
⅔-inch	Tube closed, ...	60	105	180	27 "
	Add for each inch of tube,	7	12	20	
1/10-inch	Tube closed, ...	120	210	350	55 "
	Add for each inch of tube,	12	20	35	
¼-inch	Tube closed, ...	205	360	620	70 "
	Add for each inch of tube,	25	35	60	
⅕-inch	Tube closed, ...	240	430	720	85 "
	Add for each inch of tube,	30	45	80	
⅛-inch	Tube closed, ...	450	760	1300	90 "
	Add for each inch of tube,	40	60	115	
1/16-inch	Tube closed, ...	500	920	1500	120 "
	Add for each inch of tube.	50	70	130	

MESSRS. POWELL AND LEALAND.						
Eye-pieces.	OBJECT-GLASSES. 2-in.	1-in.	½-in.	¼-in.	⅛-in.	1/16-in.
1st. Eye-piece,	20	40	75	170	330	700
2d. Eye-piece,	40	80	150	340	660	1400
3d. Eye-piece,	70	140	250	600	1200	2500

Although I have here given the magnifying powers of all the different object-glasses, it by no means follows that the practitioner need purchase a complete set, since all that he will require to do—in the great majority of instances—can be accomplished with two powers, the inch and the quarter.

The necessary accessory instruments are but few in number, consisting of a diaphragm for cutting off the most oblique rays of light, and those reflected from the mirror which are not required for the illumination of the transparent object; a bull's-eye condenser, for concentrating the light on opaque objects; a pair of forceps; glass slides, three inches by one in size; thin glass covers; a few watch-glasses, pipettes, needles, for unravelling various tissues, &c. Should expense be no

object, an achromatic condenser will be found useful, for examining those delicate structures which require achromatic light; a polarizing apparatus, for viewing various crystals and other substances by polarized light; a camera lucida, for making drawings of the appearances observed; and a micrometer, for measuring the size of minute objects.

In the perusal of foreign works on histological science, the student will be often confused by the standards of measurement employed on various parts of the Continent differing from each other, and from that used in this country—commonly the inch. The following table, from Hannover's "Treatise on the Microscope," will show at a glance the value of the different measurements:

Millimetres.	Paris Lines.	Vienna Lines.	Rhenish Lines.	English Inch.
1	·443296	·455550	·458813	·0393708
2·255829	1	1·027643	1·035003	·0888138
2·195149	·973101	1	1·0071625	·0864248
2·179538	·966181	·992888	1	·0858101
25·39954	11·25952	11·57076	11·65364	1

For the microscopical examination of the blood, sputa, vomited matters, urine, &c., see Chapter XI.

SECTION 2. THE TEST-TRAY.

In the practice of medical chemistry, a small quantity of apparatus, of an inexpensive nature, is all that is necessary, which may be conveniently arranged in a common wooden tray, about fourteen inches long, ten broad, and five deep; it should be covered in at the top by a piece of deal, in which holes must be cut to receive the test-tubes, spirit-lamp, and bottles containing the reagents.

The following articles are those which will be mostly required: A spirit-lamp; a cylindrical precipitating glass; a urinometer, for taking the specific gravity; blue litmus paper, for testing acidity; slightly reddened litmus and turmeric paper, for testing alkalinity, the former being the most delicate; watch-glasses and evaporating dishes; half a dozen test-tubes; a thermometer, with an exposed bulb; a small retort-stand; a blow-pipe; platinum foil; a glass funnel and filtering paper; glass rods; one or two pipettes; and bottles

for the following reagents: nitric acid, sulphuric acid, acetic acid, hydrochloric acid, liquor potassæ, liquor ammoniæ, a saturated solution of nitrate of barytes, solution of nitrate of silver (one drachm of the crystallized nitrate to the ounce of distilled water), solution of oxalate of ammonia, alcohol, and rectified ether. Should the practitioner prefer a more portable case, he can purchase Highley's Cabinet of Apparatus and Reagents, as selected by Dr. Lionel Beale, in which he will find,—urinometer in case, test-papers, graduated 2 oz. measure, pipette, stirring-rod, microscopic slides and thin glass, watch-glasses, test-tubes, tube-holder, brass-forceps, platinum foil, spirit-lamp with wire ring, and seven capped dropping bottles for the following reagents: nitric acid, acetic acid, ammonia, potash, nitrate barytes, nitrate silver, and oxalate of ammonia. With these agents he will be enabled to make a clinical examination of the urine, blood, sputum, &c., as far as it is necessary to do so in the practice of medicine for the purposes of diagnosis. *For the mode of making a chemical analysis of the blood and secretions, see Chapter XI.*

SECTION 3. THE SPIROMETER.

Under the designation of the pulmometre, the spirometer has been known for the last half century, but it was of no practical utility until the vital capacity of the lungs was ascertained by the laborious researches of Dr. Hutchinson.[1]

Hutchinson's Spirometer.—This instrument—somewhat resembling a small gasometer—consists of a cylindrical vessel of japanned zinc, about two feet and a half high and two feet in circumference, capable of holding many pints of water. Into it is inverted a cylinder or receiver—somewhat smaller—which is counterpoised by weights; in its cover is inserted a movable plug. Communicating with the smaller cylinder is a tube, having an elastic tube and mouth-piece attached. A graduated scale is fixed to one side of the instrument, extending some distance above the top of the large cylinder. On respiring through the mouth-piece, the air passes into the lesser cylinder, and causes it to rise by displacing the water; an indicator attached to it marks on the graduated scale the number of cubic inches of air expired. We are thus enabled readily to measure the volume of air expired from the lungs.

When the vital capacity is to be tested by this apparatus, the patient should loosen his vest, stand perfectly erect, take as deep an inspiration as possible, and then place the mouth-

[1] See Medico-Chirurgical Transactions, vol. xxix, p. 138.

piece of the spirometer between his lips. The observer having opened the tap, the patient empties his lungs, making the deepest possible expiration, at the termination of which the operator turns off the tap, thus confining the air in the receiver. The receiver is then to be lightly depressed until the surfaces of the spirit in a bent tube on the outside of the instrument are on a level with each other, when the vital capacity may be read off from the scale.

Coxeter's Portable Spirometer is of much more simple construction than the preceding, and is so compact that it can be easily carried in the pocket. It consists simply of two flexible, inelastic, air-tight bags, one being much larger than the other and communicating with it by means of a piece of tubing provided with a stopcock. It may be best compared to the human stomach and duodenum, supposing that at the cardiac orifice a mouth-piece, tube, and stopcock are attached; another stopcock at the pyloric orifice, by which the opening into the duodenal continuation can be opened or closed; and a third stopcock at the termination of the duodenal portion, by opening which this part can be emptied of its contents: we must also imagine the duodenum to be graduated, and to be capable of containing exactly fifty cubic inches of air. Suppose now that the two bags have been compressed in our hands, the air expressed from them, and that they are kept empty by closing the stopcocks; if we take a deep inspiration, apply the mouth-piece, open the stopcock and expire, the expired air will be forced into the large bag, where we retain it by closing the tap; by opening the communication with the duodenal portion, and letting it fill with the expired air from the large bag, we obtain precisely fifty cubic inches; then, by closing the communication, and opening the escape valve, we have the duodenal part again empty, and ready to measure another fifty cubic inches, or thirty, or forty, as the case may be; and so we proceed until the whole volume of the expired air in the large bag has been ascertained.

Dr. Pereira's Spirometer.—This instrument is much the same in principle as Dr. Hutchinson's. It consists of a large glass cylinder, suspended by means of a cord, in a reservoir of water, the cord passing over a pulley, and having a weight attached, so that by careful adjustment the cylinder may balance in any position. A pipe, forming the continuation of the tube through which the patient has to breathe, rises in the bell-glass above the level of the water; and by forcing the air through this tube, the vessel will ascend, and indicate, by a graduated scale affixed, the quantity of air passed into it.

SECTION 4. THE TAPE-MEASURE, STETHOMETER, PLEXIMETER, STETHOSCOPE, ETC.

The Common Tape-Measure.—A common measure thirty-six inches in length, fixed in a small German-silver box, and made to act by a spring, will be found useful in the diagnosis of diseases of the lungs. To ascertain the *circumference of the chest* we pass the tape round it, over the region of the nipples; should the patient have his shirt and flannel jacket on, we must make an allowance of a quarter of an inch for each of these articles. To learn the *mobility of the chest*, we pass the measure as just directed, request the patient to fill his lungs as much as possible by taking a deep inspiration, and note the number of inches on the measure, this being of course the greatest circumference; we then, without moving the tape, make him expire to his utmost, and noting the number of inches, we shall have the minimum circumference; the difference between the maximum and minimum will give us the mobility of the chest. In healthy persons, of ordinary weight and middle age, the average mobility is three inches, very rarely extending to four.

The Stethometer.—An instrument, called a stethometer, for measuring the expansive movements of the thorax during inspiration, and for ascertaining the difference in the mobility of opposite sides of the chest, has been invented by Dr. Richard Quain. It is a small machine about the size of a watch, with a graduated dial, and an indicator; a silk cord passes out of the side of the case and is connected by an axle with the indicator, which is capable of moving round the dial plate. The cord being extended from one fixed point on the chest to another, the extent of the respiratory movement becomes manifested by the tension made on the cord being communicated to the indicator, which thus shows the degree of expansion during inspiration, and of contraction during expiration. It is obvious that not only will the mobility of the chest be thus shown, but comparisons can also be readily drawn of the action of different parts of the chest, giving this instrument, therefore, advantages over the common tape-measure.

Dr. Sibson's Chest-measurer.—This instrument—somewhat resembling Dr. Quain's—is useful for ascertaining the diameter of the chest, and for accurately measuring the movements of respiration to the hundredth part of an inch. In form it resembles a watch, with a small bar or rack protruding from its lower part. This rack, when raised by the

moving walls of the chest, moves, by means of a pinion, the index on the dial; one entire revolution of the index showing one inch of motion in the chest, and each division indicating the hundredth of an inch.

The chest-measurer can be readily applied to any part of the body, and, by successive applications of it over the chest and abdomen, all the movements of respiration can be observed with great facility. It indicates the rhythm of respiration, showing whether the expiration be equal to, or longer or shorter than the inspiration; the character as well as the extent of motion may be read off from the dial. By it, also, we can perceive the exact amount of chest-movement, both during tranquil breathing and the deepest possible inspiration and expiration. It thus tells indirectly (though less accurately) the extreme breathing capacity of the chest, which is rendered directly and exactly by Dr. Hutchinson's spirometer; its inferiority in this respect is, however, in some measure counterbalanced, by its possessing the additional faculty of localizing the diminished movement, if it be local, and so pointing to the diseased part; or of showing it to be diffused over the whole breathing apparatus, if the disease be more general.

Plessors, Pleximeters, &c.—In practising percussion, the fingers, as a general rule, are superior to any artificial instruments. Occasionally, however, a small hammer tipped with gutta percha, or a thimble headed with the same material, may be useful as a plessor (πλησσω, I strike), and may enable us to produce a clearer stroke; these may be employed either for striking on the index or middle finger as a pleximeter (πλησσω, and μέτρον, a measure), or the pleximeter may consist of a small thin disk of ivory—as used by M. Piorry, or of wood, or of India-rubber, each being provided with lips which are used as handles. In some regions it is not always possible to percuss with the fingers with an equal degree of force on the two opposite sides, as in the axillæ. In such instances, Dr. Sibson's ingenious spring pleximeter may often be used with advantage, since, by it successive strokes are produced exactly of equal force, which ought consequently to elicit, under similar circumstances, exactly the same sound. Another advantage possessed by this instrument is the ease and precision with which it can be applied over the clothes, in which respect it will be found useful in percussing children and females, as well as men during the cursory examination usually made at the life-assurance office.

The Stethoscope.—The stethoscope (στηθος, the chest,

and σκοπέω, to examine) is a cylinder of soft wood (generally cedar) from four to eight or nine inches in length, pierced through by a longitudinal canal about a quarter of an inch in diameter, and having one extremity large and flat as an ear-piece, while the other is much smaller and funnel-shaped for application to the thoracic walls. The object of such an instrument is to collect and convey to the ear of the observer, the vibrating impulse of the air, or of the solid walls of the thorax, occasioned by the perpetual movement within.

General Observations.—From the numerous diseases which derange the acts of respiration, and from the great variety of these disturbed movements, it is clear that we cannot form a diagnosis from the mere observation of the exaggeration, restraint, or arrest of any special movement. We are not, therefore, directed to any final diagnosis by the indications derived from the spirometer, the chest-measurer, the educated eyesight, or the touch; by these we are merely led to make correctly the first step; from them we only learn that there is derangement, and in some cases its seat. By the aid of percussion we advance still further; while by the practice of auscultation—aided by a knowledge of all the symptoms—we are enabled, in the great majority of cases, to give an accurate opinion as to the situation and exact nature of the disease, whether it be fixed in some part of the organs of circulation or of the organs of respiration. What I would insist upon, therefore, is this—that neither of the instruments described in the preceding paragraphs must be trusted to alone; neither the spirometer nor the stethoscope may be leant upon as a crutch, but merely employed as a staff to explore the way; auscultation and percussion are no substitutes for other methods of diagnosis, they are merely most valuable auxiliaries.

SECTION 5. THE DYNAMOMETER.

The dynamometer is an instrument, invented probably by Mr. Graham, but improved by M. Regnier, for measuring the comparative muscular strength of man and animals; and although not used perhaps in the practice of medicine, at least to any extent, still it deserves mention. It consists of an elliptical steel spring, of about twelve inches in circumference, connected with an index and needle, so that when by pressure the two sides are made to approach each other, the needle moves upon a portion of a circle furnished with a scale of kilogrammes, and one of myriagrammes. For example,

to measure the strength of the hands, the two branches of the spring are firmly grasped, and brought as near together as the experimenter's strength will enable him to accomplish. The needle traversing the scale of kilogrammes indicates the strength of the hands. Some interesting results relating to the average strength of men at different ages, and of various weights and sizes, have been deduced by M. Quetelet, of Brussels, from numerous trials with this instrument. According to these experiments, a man twenty-five or thirty years of age is said to exert a force equal, on an average, to fifty kilogrammes, or 100 pounds.

SECTION 6. INSTRUMENTS REQUIRED FOR MAKING LOCAL APPLICATIONS IN DISEASES OF THE PHARYNX AND LARYNX.

Sir Charles Bell, MM. Trousseau and Belloc, and more recently Dr. Horace Green, of New York, were the first to resort to the practice of topical medication of the larnyx. The instruments required are, a tongue-depressor with a bent handle, by means of which the tongue can be firmly pressed down so as to expose the whole of the fauces and the upper edge of the epiglottis; and a whalebone probang, about ten inches long, bent in a curve, and having securely fastened to its extremity a nodule of fine sponge, about the size of an ordinary bullet. The solutions of nitrate of silver generally employed are of three strengths, consisting either of ℈j, or ℈ij, or ʒj, to ℥j of distilled water. The method of introducing the saturated sponge is described somewhat thus by Dr. Hughes Bennett, in his treatise on Pulmonary Tuberculosis. The patient being seated on a chair and exposed to a good light, the practitioner stands on the right side, and depresses the tongue with the spatula held in the left hand. Holding the probang in the right hand, the sponge of which has been saturated with the solution, it should be passed carefully over the upper surface of the spatula, *exactly in the median plane*, until it is above or immediately behind the epiglottis. The patient must now be told to inspire, and as he does so, the tongue should be dragged slightly forwards with the depressor, and the probang thrust downwards and forwards by a movement which causes the right arm to be elevated, and the hand to be brought almost in contact with the patient's face. The operation of course requires dexterity, since the rima glottidis is narrow, and unless the sponge comes fairly down upon it, the aperture is readily missed.

The passage of the sponge into the proper channel may be determined by the sensation of overcoming a constriction, which is experienced when the instrument is momentarily embraced by the rima, as well as by the spasm and harsh expiration which it occasions. The application will generally require to be made about every other day, for a few weeks.

SECTION 7. THE OPHTHALMOSCOPE.

Attention has lately been directed in this country, by Mr. Spencer Wells and Dr. Wharton Jones, to an instrument invented by Dr. Helmholtz, of Konigsberg, for exploring the interior of the eyeball, in order to diagnose especially the morbid states of the vitreous body, the choroid, and retina. There are several modifications of the ophthalmoscope, but the most simple seems to be that of Coccius, which consists of a small plane mirror with a hole in its centre, so held that the light which falls on it from a lamp, concentrated by a double convex lens, is reflected into the eye to be examined: the observer looks through the hole in the centre. When the observed or observer's eye is short-sighted, a concave glass is placed before the observed eye. By means of this instrument, or one similar to it in principle, morbid changes in the retina could be distinctly recognized in the majority of the cases of blindness examined.

SECTION 8. THE SPECULUM UTERI, THE UTERINE SOUND, ETC.

In the diagnosis of disease of the uterine organs we derive assistance mainly from four sources: 1, from the history and symptoms; 2, from a tactile examination—the touch: 3, from a visual examination with the speculum; and 4, from the use of the uterine sound. I shall only speak here of the instruments required in such examination.

The Speculum.—The instrument is by no means of modern invention, assistance having been derived from its employment for many years; and although numerous arguments have been adduced in the present day against its use, from its abuse, yet still it is found—as before—impossible to diagnose many examples of uterine disease without its aid. Several varieties of speculum have been invented, and doubtless the ingenuity of mechanists will furnish more. The one that I am constantly in the habit of using is that known as Ferguson's, which consists of a cylinder of glass, silvered externally, and then covered with a thin layer of caoutchouc. It is ne-

cessary to have four or five of these instruments of different sizes; they should also be furnished with movable plugs, projecting about an inch and a half from the uterine extremity, to facilitate their introduction. My colleague, Dr. Protheroe Smith, has invented a very useful speculum by which a visual and digital examination can be made at the same time. It is formed of two cylinders, the outer one being of metal, and the inner of glass; in the former is an oval opening, to allow of the passage of the finger. When the instrument is introduced, the glass tube is withdrawn if a digital examination be necessary, and the finger being then passed into the vagina posteriorly, enters the fenestrum and so reaches the os uteri. A third kind of speculum, which is often useful, is that made by Mr. Weiss, and which consists of two parts—a dilator and a cylinder. The dilator possesses three blades, which are expanded by turning the handle; when sufficiently dilated, the cylinder is introduced between the blades.

Either of these instruments can be readily introduced, and all the advantages to be derived from their use obtained, by placing the patient upon a couch, on her left side, with the knees drawn up—in fact, in the some position as for labor. The practitioner should be careful that no exposure of the person takes place, and must avoid anything approaching to force in passing the speculum up to the os uteri.

The Uterine Sound.—In the diagnosis of displacements of the uterus, or of tumors of this organ, this instrument—the invention of Professor Simpson—will be found invaluable. To give an idea of the uterine sound, it may be compared to a metallic bougie, curved so as to correspond with the natural direction of the uterine cavity, and fixed in a wooden handle, to facilitate manipulation. Its stem is divided into inches, and two-and-a-half inches from the point is a slight elevation, indicating the depth of the uterine cavity in its normal state. It may be introduced through the speculum, or merely along the finger passed up to the os uteri. I need hardly say that its use demands caution and gentleness; and although it may be feared that in unskilful hands it has produced abortion and other serious consequences, yet I believe that, when used by those capable of using instruments generally, it has never been productive of the slightest mischief, but, on the contrary, has proved a very valuable aid to the correct interpretation of disease.

Sponge-Tents.—The dilatation of the os uteri is sometimes rendered necessary by a suspicion of the existence of intra-uterine polypi. A series of sponge-tents should be em-

ployed for this purpose, a small one being first introduced between the lips of the cervix uteri, succeeded by a larger one and a larger, until the amount of dilatation we desire has been obtained. Where rapid dilatation is required, Dr. Protheroe Smith sometimes uses an instrument very similar to a lithotrite for producing this condition. Great caution, however, is necessary in the employment of such an instrument.

CHAPTER III.

ON DISEASE.

SECTION 1. THE NATURE OF DISEASE.

DISEASE is known only by comparing it with the standard of health, from which it is a departure. The standard of health varies in different individuals, but speaking generally, it may be said that health consists in a natural and proper condition and proportion in the functions and structures of the several parts of which the body is composed. Physiology teaches us that these functions and structures have to each other as well as to external agents certain relations, which—being most conducive to their well-being and permanency—constitute the condition of health. But from the same science we also learn indirectly, that function and structure may be in states not conducive to their permanency and well-being—states which disturb the due balance between the several properties or parts of the animal frame; and these states are those of *disease*. Thus we learn from daily experience that in health the digestion of food is easy and comfortable. But when uneasiness, pain, flatulence, eructation, sickness, and the like, follow the taking of food, we know that the *function* of digestion is changed from the healthy standard—that it is *diseased;* and if this diseased function continue long, in spite of remedies which usually correct it, and if on examining the abdomen we find at or near the epigastrium a hard tumor, which anatomy teaches us is not there in health, we know that there is also *diseased structure*. We find then that there is *disease of function*, known by its deviation from a physiological standard; and a *disease of structure*, which we recognize by an anatomical standard. These varieties of disease are commonly combined, structural disease without disordered function being rare; while functional disease is often accompanied—or at all events followed—by change of structure.[1]

[1] Dr. C. J. B. Williams's Principles of Medicine. Second edition, p. 2.

Functional Diseases.—The leading features of this class of disease may be briefly spoken of in connection with the two most important systems of the body—the vascular and the nervous.

In the vascular system there may be an *excess* of blood, either generally or locally. Excess of blood generally, causes plethora, with often increased natural secretions, increased functional vigor, irregular actions, excessive—and perhaps morbid—growths. Locally increased supply of blood merely gives rise to excitement, or to congestion, with oppression of the congested organ. A *defective* supply of blood may also be general or local; when general, producing anæmia; when local, causing defective secretions, loss of energy, and a tendency to disordered actions. The supply of blood may likewise be *perverted*, and thus produce disordered function.

In the nervous system we equally notice excessive, deficient, or irregular distribution of nervous force, giving rise to temporary loss of health. Nervous disturbance may exist alone, or may be combined with vascular irregularity, producing various affections of nutrition, secretion, absorption, evacuation, muscular motion, or of the sensorial offices, or of the intelligence and will. But, as before observed, functional derangement seldom continues long without producing,—

Structural Diseases, which may be comprehended under the three heads of increased, diminished, and perverted nutrition. Dr. Williams (op. cit. p. 345) has arranged the elements of lesions of structure in a table, essentially similar to the following.

- Diseased Nutrition.
  - Increased—Hypertrophy.
  - Diminished—Atrophy.
  - Perverted.
    - Inflammation.
    - Induration.
    - Softening.
    - Transformation and Degeneration.
    - Deposits.
      - Euplastic. — Cicatrices; False membranes.
      - Cacoplastic. — Cirrhosis; Fibro-cartilage; Gray tubercle; Atheroma, &c.
      - Aplastic. — Yellow tubercle; Calcareous matter, &c.
    - Growths.
      - Non-malignant. — Cysts; Tumors; Hydatids, &c.
      - Malignant. — Carcinoma; Encephaloma; Melanosis, &c.
- Disorders of Mechanism.
  - Contraction.
  - Dilatation.
  - Obstruction.
  - Compression.
  - Displacement.
  - Rupture, &c.

Acute and Chronic Diseases.—The terms acute and chronic have been arbitrarily employed to indicate the extreme states, in respect to nature and duration, of certain diseases. It must be remembered, however, that acute diseases often become chronic, and *vice versa;* that a disorder may be acute in its nature and chronic in its duration; and that there may be disturbed action in every intermediate degree between these two extremes.

Zymotic Diseases.—Zymotic (from ζυμοω, to ferment) is an epithet proposed to characterize the entire class of epidemic, endemic, infectious, and contagious diseases.

Epidemics (επι, upon, and δημος, the people) are such diseases as occasionally infest a community, more or less generally, at the same time, and which are apt to recur at uncertain intervals. They may be not inaptly compared to the blights or tribes of animalcules which appear and disappear without any evident cause, and which at certain seasons produce such havoc in the vegetable kingdom; it is not improbable that they are due to some atmospheric influence, though the nature of this influence is unknown. Cholera, influenza, and fever are the epidemics from which we suffer the most severely: the ravages from cholera having been most alarming as it has gradually traversed Asia, Europe, and America, in the year 1831–1832, 1848–1849, and 1853–1854.

The disease is said to be *endemic* (εν, in or among, and δημος) when it is peculiar to, or especially prevalent in, any particular locality. Thus ague is endemic in low marshy districts, goitre in certain parts of Derbyshire, Switzerland, &c. But a disease may also be epidemic and endemic, as is the case with cholera, which appears to be endemic in India, and epidemic only in Europe.

Contagious diseases are those which are communicable from one person to another. The terms contagion and infection are generally employed synonymously, though some have applied the word infection to the communication of disease from the sick to the healthy by a morbid miasm or exhalation diffused in the air, reserving contagion to express the transmission by immediate or mediate contact. Since, however, it is obvious that these are merely modes of the same agency in the great majority of cases, it seems better to view contagion as merely one mode of infection. There are three modes in which infection may be produced: 1, through wounds or an abraded surface, as in hydrophobia, vaccination, &c.; 2, through contact, as we see in gonorrhea, syphilis, and certain cutaneous affections depending upon the existence of parasitic

plants or animals; and, 3, through exhalations from the skin, breath, perspiration, or other secretions, which becoming diffused through the air to a certain extent, infect those who come within reach of the poison, as is seen in measles, small-pox, pertussis, fevers, and similar infectious disorders.

Sporadic Diseases.—Diseases which attack only one person at a time, and which supervene indifferently in every season or locality, from accidental circumstances, and independently of epidemic or contagious influence, are termed sporadic. Thus dropsy, cancer, gout, diseases of the heart, and the great majority of the affections to which flesh is heir, are sporadic. Occasionally, when an epidemic proceeds slowly from one person to another, the attacks are said to occur sporadically.

Continued, Remittent, and Intermittent Diseases.—Fevers are called *continued*, when they pursue their course without any well-marked remissions. In *remittent* fevers certain intervals occur daily in the course of the disease, in which intervals there is no cessation of the fever, but simply an abatement or diminution. The remissions usually occur towards the morning, and continue for six, ten, twelve, or fourteen hours: they are followed generally, by increased feverish excitement or exacerbation towards night, continuing for some hours. In *intermittent* fevers there is an interval of almost perfect health. The three common species of intermittent fever or ague, are the quotidian, tertian, and quartan. When the paroxysm occurs at the same hour every day, it is called quotidian ague; when every other day, tertian, though secundan would be more appropriate; and when it is absent for two whole days and then recurs, quartan. In the first species the interval is twenty-four hours, in the second forty-eight, in the third seventy-two. The time between the commencement of one paroxysm and the beginning of the next is termed the interval; that between the termination of one paroxysm and the commencement of the next, the intermission.

Hereditary, Congenital, Acquired, Specific, and Malignant Diseases.—*Hereditary* diseases are such as are transmitted from an ancestor or parent to a descendant or offspring; they may exist at birth, or may become developed at any subsequent period of life: gout or scrofula furnish examples. *Congenital* affections are those born with the individual, as congenital cataract, hernia, &c. Hereditary and congenital affections differ from those which are *acquired*, that is to say, derived from causes operating after birth. The term

specific is sometimes applied to diseases which are marked by some disordered vital action not belonging to disease in general, but peculiar to the individual case; thus syphilis and hydrophobia are specific diseases. *Malignant* diseases are those which are of a highly dangerous and intractable character, and the symptoms of which are generally very formidable from the commencement. Certain forms of typhus and typhoid fever, which rapidly depress the vital energies, are said to assume a malignant type: so again, cholera is often called malignant. By some this term is used to denote cancerous affections.

Asthenic, Idiopathic, Symptomatic, and Intercurrent Diseases.—Most of these terms explain themselves, but it may be as well to mention that diseases attended by manifest depression of the vital powers are said to be *asthenic*, in contradistinction to those marked by activity of the vital forces—*sthenic* disorders. Diseases, also, which are not dependent upon or symptomatic of others, are called *idiopathic* or *primary;* while *intercurrent* disorders are those which arise in individuals from incidental causes during the prevalence of zymotic diseases.

SECTION 2. THE CAUSES OF DISEASE:—ETIOLOGY.

Whatever is capable of deranging either of the functions or any part of the structure of the human body, must be ranked amongst the causes of disease. It is not surprising, therefore, considering the numberless variety of circumstances to which man is exposed, that these causes are very numerous, that in any particular case they often elude our observation, and that many attempts have been made to classify them without any marked success. Thus they have been divided into external or extrinsic, and internal or intrinsic, according as they operate on the body from without or from within; into predisposing and exciting; into general and local; proximate and remote; into *causæ abditæ* and *causæ evidentes;* into mechanical or chemical, and physiological; and so on. The true simple view of all causes is, that they are circumstances of the most variable nature inducing disease; and the most simple division of them probably is into predisposing and exciting. They may be arranged in two tables, partly according to the plan adopted by Dr. C. J. B. Williams, in his excellent work on the Principles of Medicine, from which I have already quoted.

- 1. Predisposing Causes of Disease.
  - Debilitating influences.
  - Excitement.
  - Previous disease.
  - Present disease.
  - Hereditary constitution.
  - Temperament.
  - Age.
  - Sex.
  - Occupation.
  - Climate.
- 2. Exciting Causes of Disease.
  - 1. Cognizable Agents . .
    1. Mechanical.
    2. Chemical.
    3. Ingesta.
    4. Bodily exertion.
    5. Mental emotion.
    6. Excessive evacuation.
    7. Suppressed or defective evacuation.
    8. Defective cleanliness, ventilation, and drainage.
    9. Temperature and changes.
    10. Parasitic plants and animals.
  - 2. Non-cognizable Agents.
    1. Eudemic
    2. Epidemic
    3. Contagious

} Poisons.

The scope of the present Manual will not permit of my treating of each of these causes *in extenso*, neither is it necessary to do so. I must, however, say a few words on the non-cognizable causes or those due to miasmata secreted by the human body, or generated largely from unknown sources, which especially deserve the attention of the medical philosopher, since they are most appalling in their effects, and but very little is known of their nature. These morbid poisons are all subjected to certain general laws, the most important of which are—

1. That they all have, not capricious, but certain definite and specific actions, and that they each affect especially certain organs, as in scarlatina—where the eruption differs from all other eruptions, runs a course peculiar to itself, and where the force of the poison is expended on the skin and mucous membranes; in hooping-cough—where the virus affects the organs supplied by the eighth pair of nerves or the pneumogastrics.

2. That, after mingling with the blood, they continue in latent combination with this fluid for a certain period of time before their specific actions are set up. Thus in small-pox there is a latent period—between infection and the appearance of the phenomena of the disease—of from twelve to fifteen days; in measles from twelve to fifteen days; in scarlatina from four to six; and in ague an unknown period, twelve months even having elapsed between the time of exposure to the malaria and the appearance of the fever.

3. That the phenomena resulting from the poison, when roused into action, vary to a certain extent, according to the strength of the poison, and the predisposition, temperament, and constitution of the patient.

4. That they possess the power of generating to an immense extent a poison of the same nature as that by which the disease was first produced. Thus a quantity of small-pox virus almost inappreciable in size may produce thousands of pustules, each containing fifty times as much pestilent matter as that originally introduced.

And 5. That many of these poisons possess the extraordinary power of exhausting all future susceptibility in the constitution of the affected party to any similar action of the same agent, as is well known to be the case in scarlatina, small-pox, hooping-cough, &c.

In considering the importance of the various causes of disease individually, the student must bear in mind that disease may be induced by one only, or by several acting together or in succession; and that they are modified by several circumstances, but especially by the *vis medicatrix naturæ*, which, in healthy persons, is sufficient to resist the force of many circumstances that would otherwise give rise to disordered action.

SECTION 3. THE CLASSIFICATION OF DISEASE:—NOSOLOGY.

In order to simplify the study of morbid processes, it has been found necessary to briefly designate the important peculiarities, phenomena, and situations of diseases, and to classify them according to some definite plan, dividing and subdividing them into classes, orders, genera, and species. The word Nosology is used to express this classification. Several nosological systems have been proposed. Thus Sauvage divided disease into ten classes,—*vitia, febres, phlegmasiæ, spasmi, anhelationes, debilitates, dolores, vesaniæ, fluxus, cachexiæ*, taking as the foundation of each class the most prominent symptoms. Cullen, proceeding on the same plan, endeavored to simplify this arrangement by reducing the classes to four,—*pyrexiæ, neuroses, cachexiæ*, and *locales*. The great error in these classifications is, that symptoms are regarded as the essential parts of disease, whereas they are merely indications, are very variable, and by no means uniformly correspond with the amount of disordered function or diseased structure present. Thus delirium forms a promi-

nent symptom in many diseases of the most opposite nature; but what an amount of error would be involved were these disorders all classed together on account of this symptom. The true foundation of a natural classification of diseases is—as observed by Dr. Williams—in a correct pathology, or knowledge of the intimate nature of diseases; the subdivisions being conveniently determined by the chief seat of the disease, or by some of its more prominent characters. There are, doubtless, many difficulties in the way of making such a classification, and when made it will be imperfect; still it will be the best, and will approach the nearest to that which is unattainable—a perfect methodical nosology.

SECTION 4. THE DIAGNOSIS OF DISEASE.

The correct diagnosis of disease—the distinction of diseases from one another—is the most important part of the physician's duty. To discriminate well the malady, and to discern its effect upon the patient, requires the highest skill—a skill which can only be obtained by observation and practice.

In attempting to make out the nature of a disease, every branch of medical knowledge must be brought to bear upon the inquiry; information must be sought from every source likely to afford aid. Having carefully learnt the general history of the patient, we must examine all the symptoms, investigate the condition of suspected tissues or organs, inquire into the assigned cause, and take into consideration all controlling influences, such as age, sex, temperament, habits, modes of living, constitutional peculiarities, &c. Accidental circumstances often aid us considerably, especially when the patient is unwilling to impart all the information he is capable of giving. At the same time the feelings, prejudices, and mental peculiarities of the sufferer must be consulted, and the practitioner should endeavor to come to a correct conclusion with as little that is disagreeable to him as possible.

Bishop Butler has well said that "probability is the guide of life," since man may have sufficient evidence in a thousand cases to warrant his actions, though that evidence is very far removed from certitude. This is especially the case in the diagnosis of disease, numerous maladies being discriminated, treated, and cured as often under the guidance of sober conjecture as of undisputed certainty. Such conjecture, however, is very different from arrogant guesswork, which fails much more frequently than it succeeds, and knows not why it succeeds or fails. "The conjecture which should guide the

physician is rigorous, and calculating, and honest. It acts strictly by rule and leaves nothing to chance. It does not absolutely see the thing it is in quest of, for then it would no longer be conjecture. But, because it does not see it, it ponders all its accidents and appurtenances, and noting well whither they point, it takes aim in the same direction, and so oftener hits the mark than misses it. And succeeding thus, it knows why it succeeds, and it can succeed again and again upon the same terms. Next to knowing the truth itself, is to know the direction in which it lies. And this is the peculiar praise of a sound conjecture."[1]

The mode of diagnosing particular diseases will be treated of in a subsequent part of this work.

SECTION 5. THE PROGNOSIS OF DISEASE.

In forming an opinion as to the future course, changes, and termination of any disease, we must be chiefly guided by our knowledge of the general progress of the class of disorders to which it belongs, by the effect which the disease has had upon the patient, by the degree to which it has hitherto been controlled by remedies, and by the extent to which they are likely to be further beneficial. It is usually of the greatest consequence that the character of a disease should be plainly perceived. In cases where there is a reasonable chance of recovery the stimulus of hope is of great service, and in itself favors the return to health. On the other hand, where a fatal termination is indicated, a sick man, made aware of his danger, is enabled to arrange his worldly affairs, to make his will, and to prepare for the awful change that awaits him. Foreseeing the event of a disease, it becomes a question whether the practitioner should divulge his opinion. There is always some risk of losing instead of gaining credit, by strong statements, and confident predictions of the death or recovery of a patient.[2] Hippocrates, in one of his aphorisms, says, "in acute diseases it is not quite safe to prognosticate either death or recovery." By giving an unfavorable prognosis, you may lose your patient altogether; for the friends, naturally arguing that you are not infallible, that you may be mistaken, and that because you know no means of safety, it is no reason why another practitioner should not be more successful, dismiss you to seek other advice. This is not merely a selfish question; for it is the practitioner's duty to save his

[1] Lectures on Diseases of the Heart, by P. M. Latham, M.D. vol. ii, p. 5.
[2] Watson's Practice of Physic, third edition, vol. i, p. 114.

patient from those unprincipled rapacious quacks who will undertake to cure any case, however hopeless it may be, provided that there is sufficient plunder to be obtained. Moreover, it often happens that a person is dangerously ill of a disease from which, however, recovery is by no means impossible. To take away hope in such an instance is often to cut the thread of life. In these cases, my own plan is to communicate the condition of the patient to his most judicious friend solely. But when my opinion is asked by a sufferer from phthisis, cancer, &c., and where there is no hope whatever of the patient's life being long spared, I then think it a positive duty to communicate my opinion to him, stating the case fairly as to a reasonable being, explaining fully my own opinions, and giving reasons for them. In many instances of cancer of the uterus, for example, where I have been called upon to state my views, I have done so fairly and unreservedly; and I certainly have never had cause to regret doing so, having retained the patients under my care, in, at least, the majority of the cases, and having, I believe, seen them soothed and better prepared for the fatal event by the information, than if they had been deceived. Indeed, for my own part, I should regard that man as dishonest who would hold out hopes of curing a patient, when he clearly saw that such was impossible.

The instances in which the conscientious practitioner may feel the greatest difficulty are cases of heart disease, since, so strong is the belief that sudden death is the termination of these affections, that great, injurious, and permanent mental anxiety will result from telling the patient of his condition. I should then communicate with some dear relative, explain the case fully, and at the same time endeavor to convince that in the majority of examples of cardiac disease death does not occur suddenly, but as Dr. Stokes insists, gives notice of its approach by long-continued symptoms of dropsy, pulmonary, and hepatic disease.

SECTION 6. THE TERMINATIONS OF DISEASE.

All diseases ultimately terminate in health or in death. Before ending in either, they may assume different forms and characters to those which they originally presented, or they may give rise to other diseases, or they may change their situation by what is termed metastasis.

Termination in Health.—This takes place in very diversified modes, according to the nature of the malady; in all

cases it is due to the subsidence of the morbid actions, and to the vital energy. In some instances—nervous affections, for example—convalescence takes place suddenly. Most frequently, however, the change is gradual, especially in acute diseases; a diminution in the frequency of the pulse, a cleaning of the tongue, and a restoration of the secretions to their normal condition, being the earliest symptoms. Often, convalescence goes on happily; but frequently, also, it is delayed by unpleasant symptoms, such as night-sweats, loss of appetite, mental despondency, restlessness, &c. Sometimes the cure is interrupted by a return of the disease—by a *relapse*, in which the patient's position is rendered more unfavorable by the debility and unrepaired mischief remaining from the first attack.

Great importance was formerly attached, during the progress of a malady, to what were termed *crises*, or turning points—whether favorable or unfavorable—in the disease. Critical days, critical symptoms, critical discharges, &c., were then anxiously looked for. Hippocrates, who first drew attention to critical changes, believed that disease was more prone to alter at certain periods than at others, and he accordingly designated the seventh, fourteenth, twentieth, twenty-seventh, thirty-fourth, and fortieth days as critical days. Crises are said to manifest themselves chiefly by a diminution of fever, by sweats, hemorrhages, increased flow of the secretions, eruptions of the skin, boils, carbuncles, buboes, salivation, and gangrene. The existence of critical days and critical symptoms has been denied by most modern authorities, as, at least, not applying to diseases as they now exist; copious and apparently critical discharges not only frequently appearing without any influence upon the progress of the symptoms, but many disorders ending favorably, without any excretion which could be at all regarded as critical. It cannot but be allowed, however, that there is at all events, a foundation of truth in these ancient doctrines; and the practitioner will do well to remember that where relief follows from the appearance of critical symptoms, they at least show the direction in which nature is acting, and point the way in which the physician must work, in order to aid and not thwart the *vis medicatrix naturæ*. The careful investigations of Dr. Traube, of Berlin,[1] which have led him to revive the doctrine of crisis and critical days in fever, are deserving the attention of the reader who wishes to learn all that can be said on this interesting subject.

[1] Ueber Krisen und Kritische Tage. Von Dr. L. Traube, Berlin, 1852.

Not unfrequently an acute disease becomes *chronic;* that is to say, the symptoms subside without disappearing, and continue for a lengthened period.

Another mode in which disease may leave a particular organ is by *metastasis*—from μεθιστημι, I transfer. This change is perhaps most frequently seen in gout or rheumatism, either of which, suddenly disappearing from the affected joint, may attack the head, or heart, or stomach. Dr. Copland mentions two instances which fell under his own observation, and which serve to elucidate this subject.[1] A medical friend suffered from gout in the lower extremities, for which he took a large dose of colchicum, before the morbid secretions had been evacuated. He almost instantly had a violent attack of the disease in his stomach, with simultaneous disappearance of it from the original seat. The free use of stimuli caused it to relinquish the stomach, and to reappear in the extremities. In this case, the transfer from one place to the other was instantaneous, the medium being evidently the nervous system. The second patient had, upon suppression of gout from the lower extremities, an attack of simple apoplexy, for which he was bled and purged. When Dr. Copland saw him he was comatose, but the head was still cool. Mustard sinapisms to the feet, and ammonia with camphor, were ordered; the gout suddenly reappeared in the feet, the patient at the same time awakening as from a profound sleep, and without evincing subsequently the least cerebral disturbance, either organic or functional. Another form of metastasis is often seen in cutaneous affections, when the eruption suddenly ceases—often from improper medical interference—and dangerous disease is developed in internal organs. The same may also happen from the suppression of morbid secretions, of discharges from ulcers, &c., which have become necessary to the sustenance of health.

The Termination in Death.—Death is the condition to which all organized bodies must ultimately be reduced. It may take place naturally and gradually from old age—from exhaustion of the vital forces, the active powers gradually deserting each organ, the functions of absorption and secretion being arrested, the general circulation becoming slowly suspended, and the heart ceasing to contract. Unfortunately, death from mere old age is very rare. Haller estimated the average probability of human life, and deduced the conclusion that only one individual in 15,000 reaches the hundredth year.

[1] Medical Dictionary, vol. i, p. 600.

Seeing, then, that death from disease or accident is the rule, it behooves us, as guardians of the public health, to do our utmost to remove the causes of disease, and to treat that which is unavoidable with the greatest skill and caution. Death from disease may take place in two ways—either suddenly, the transition from life to death being made in a moment, without warning,—or slowly and gradually, as the termination of some lingering disorder.

The most frequent causes of *sudden death* are, apoplexy; rupture of an aneurism or large bloodvessel into one of the three great cavities of the body; disease of the valves of the heart—the liability to sudden death being greater in disease of the mitral valve than in aortic valvular disease; rupture of the heart, from fatty degeneration; laceration of the chordæ tendineæ; asphyxia, from obstruction of the glottis, or the bursting of purulent cysts into the air-passages; syncope, from severe shock or alarm; and injury of the spinal cord. As regards the last-mentioned cause of sudden death, it must be remembered that as the phrenic nerve arises from the third, fourth, and fifth cervical nerves, so any severe injury to the cord above the origin of the third nerve will produce instant death, by suddenly paralyzing the diaphragm and intercostal muscles; while if the injury occurs below the sixth vertebra the patient may live for some hours, if not days, although the action of the greater number of the intercostal muscles must be wholly or partially arrested.

One or two examples of sudden death have occurred lately, in which the cause seemed to be latent pneumonia of one lung. Slight indisposition appears to have been complained of for a day or two, when suddenly, without any apparent reason, death has taken place. Dr. Quain and Mr. Ashton have related cases to this effect.

A large number of instances of sudden death occur annually in this country from the different causes just enumerated. Very curiously, it appears that women have less chance of dying suddenly than men—in the proportion of ten to eighteen—but that more women than men die from paralysis. This is proved by the following table, taken by Dr. Granville from the reports of the Registrar-General, of the number of sudden deaths, and of deaths from apoplexy and paralysis, in all England and Wales, males and females, for the years as follows:[1]

[1] Granville on Sudden Death.

	SUDDEN.			APOPLEXY.			PARALYSIS.		
Years.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
1847	2154	1554	3708	4007	3874	7881	3376	3695	7069
1848	1811	1386	3197	3898	3704	7602	3213	3458	6671
1849	2012	1543	3555	3896	3901	7797	3428	3900	7328
1850	2025	1535	3560	4078	4016	8094	3473	3844	7317
Total.	8002	6018	14020	15879	15495	31374	13490	14895	28385

Death as it occurs in disease is usually complicated: but in all cases, whether it take place suddenly or gradually, or whatever may be the malady, it approaches through one of the three vital organs—the brain, the heart, or the lungs. Life being inseparately connected with the circulation of arterial blood, death takes place directly the action of the heart is completely arrested; and since the action of the heart is dependent upon the more or less perfect condition of all the vital organs, which stand in a peculiar reciprocal relation to each other, a cessation of the functions of either of the three speedily arrests the remaining two. Thus innervation of the muscles of respiration depends upon the medulla oblongata, the energy of the medulla oblongata upon the decarbonization of the blood, and the decarbonization of the blood upon the circulation and respiration. The force of the heart, if not directly, is indirectly connected with the medulla oblongata, because the circulation of venous blood destroys the irritability of the muscles. And so it results that failure in any one of the three links in the chain is fatal. Hence Bichat spoke correctly of death beginning at the head, at the heart, and at the lungs.

We may have then—1st, *Death by Anæmia*, that form which is caused by a want of the due supply of blood to the heart. The deaths from flooding after labor, from the bursting of aneurisms, &c., are good examples of this form; on examining the heart afterwards, the cavities are found empty, or nearly so, and contracted. 2d, *Death by Asthenia*, in which there is no deficiency of the proper stimulus to the heart's action—the blood, but a total failure of the contractile power of this organ. The effects of certain poisons—as hydrocyanic acid, of strong mental emotion, of lightning, &c., furnish good illustrations of this form. The state of suspended animation common to both these modes of dying, is termed syncope. 3d. *Death by Asphyxia*—or, as Dr. Watson terms it, by *apnœa*, or, as we say commonly, by suffocation—is that which occurs

when the entrance of air into the lungs is in any way stopped, as in drowning, strangulation, spasmodic closure of the rima glottidis, &c.; in this mode death begins in the lungs. The blood being unaerated, continues venous, passes through the pulmonary veins into the left side of the heart, and thence through the arteries to all parts of the body. Venous blood, however, being unable to sustain the functions of the organs to which it is sent, its effect on the brain is at once seen by the convulsions and insensibility which ensue; the blood in the pulmonary capillaries becomes retarded, and gradually stagnates, leaving the lungs and right chambers of the heart full and distended. 4th, *Death by Coma*, in which extinction of organic life takes place in the same way as in the preceding case, the difference between the two forms of dying being this—that in death by apnœa, the chemical functions of the lungs cease first, and then the circulation of venous blood through the arteries suspend the sensibility; whereas in death by coma, the sensibility ceases first, and in consequence of this the movements of the thorax are arrested, as well as the chemical functions of the lungs. Thus the circulation of venous blood through the arteries is in the one case the cause, in the other the effect, of the cessation of animal life.[1]

CHAPTER IV.

ON THE VARIOUS CIRCUMSTANCES WHICH MODIFY DISEASE.

Having shown in the previous chapter that disease consists of disordered action in one or more parts of the machinery of the body, it becomes necessary now to prove that these disordered actions vary much, in their nature, severity, and duration, in different individuals; being modified by age, sex, constitution, temperament, and many other circumstances which I now propose to speak of. To discriminate well the malady and the exact condition of the patient, and to regard both in the attempt to cure disease, must be the constant endeavor of the skilled practitioner. The same disease in one individual often assumes a different character in another, and requires consequently a different method of cure. Just as we never find two individuals perfectly alike in features, stature, strength, constitution, &c., so we learn that disease

[1] Dr. Watson, op cit. Lecture V.

becomes varied and modified, although its broad principles may remain unaltered. Physiologists have long since shown us, that a poison of such potency as to destroy the life of an animal in two minutes when introduced into the system, will produce its fatal effect in half a minute if the animal's strength be reduced by bleeding. We are all familiar with the fact that in typhus fever, for example, the patient will bear a very large quantity of alcohol without being affected by it, just as in tetanus and hydrophobia scarcely any amount of opium will tranquillize the nervous system. So, again, there are some few persons with constitutions so insensible to the action of mercury, that no quantity will affect their gums or increase the secretion of the salivary glands; while others, on the contrary, are so susceptible, that it is scarcely possible to administer a grain of this metal without giving rise to its specific effects. If, then, disease or constitution so qualifies the action of these powerful agents, is it not reasonable to suppose that many conditions of the system may in like manner modify disease? And this is really the case. How often, for instance, do we see many people differently circumstanced exposed to the *same* morbid agency with a *varied* result. Thus, of half a dozen persons exposed to the same noxious influence—say that of wet and cold—one shall have rheumatism, one an attack of influenza, a third catarrh, a fourth ophthalmia, and so on. Again, a man may be exposed to the influence of some infectious disease—as small-pox—and not being predisposed to suffer from infection may escape unharmed. Yet in a few days, nay, in a few hours, with his system depressed from fatigue, the same morbid element being encountered, he no longer escapes its influence, and the variolous poison takes root—so to speak—and produces its well-known fruit. Nature, thus apparently capricious, works according to certain general laws; and although our present knowledge may not enable us on all occasions to solve these laws, yet that they admit of solution there can be no doubt.

The following are the circumstances which chiefly modify the nature, severity, and duration of disease:

1. Sex.—Both sexes are equally liable to many diseases. Females, however, on account of the greater excitability of their nervous system, and owing to their possessing an organ —the uterus—whose lesions affect the whole system, are especially predisposed to nervous complaints; and such causes as give rise to inflammation in males, will in them often produce merely functional disorder. Thus gout and rheumatism often lurk unsuspected in the female system,

causing dyspepsia, palpitation, uterine and neuralgic affections, without manifesting themselves more openly. It has been said that during the prevalence of epidemics women suffer less than men; which is probably to be accounted for by their more regular habits, and their being less exposed to the exciting causes of these diseases. The uterus is the active centre of sympathies, from puberty to the period of the change of life. The regular flow of the catamenia becomes essential to health, and the interruption or cessation of the discharge, except under certain circumstances, often proves the cause of great constitutional disturbance. About the age of puberty women are apt to suffer from anæmia, chorea, and hysteria. The condition of pregnancy is favorable to health; while at the cessation of menstruation chronic inflammations and lesions of the uterus, diseases of the breast, disorders of the colon and rectum, and cancerous affections, are likely to occur.

2. Age.—Each of the various epochs of life is liable to certain peculiar diseases. *During the earliest period*—from birth to first dentition—not only is the body very frail, but there is great irritability and sensitiveness, a predisposition to spasms and convulsions, to hydrocephalus, inflammation of the brain or its membranes, and to rickets, &c. Mankind spring not up full-formed, and ready armed for battling with adversity, like the fabled army from the teeth of dragons sown by Cadmus; but rather as the seed which is scattered from the hand of God over all the earth.[1] As then the young plant requires care and attention proportioned to its frailness, so the tender infant demands the most constant watchfulness and judicious management. The process of dentition alone keeps up a constant irritation which impairs the functions of the brain, alimentary canal, and skin; and many children die during teething. So slender indeed is the thread of life, and so serious are the various infantile diseases, that one child in every five dies within a year after birth, and one in three before the end of the fifth year.

After the first dentition to the sixth or seventh year, the powers of life become more energetic; there is great excitement of the vascular and nervous system, easy exhaustion but also easy restoration. The predisposition is to inflammatory affections, to attacks of fever, and to the exanthematous disorders. In the inflammatory diseases of children there is a strong tendency to the formation of coagulable lymph,

[1] On the Use of the Body in relation to the Mind. By G. Moore, M.D.

and to the exudation of false membranes upon the mucous surfaces.

After the second dentition until the age of puberty, is one of the healthiest periods of life, the vital functions reacting readily upon the depressing causes of disease, and being eminently conservative in resisting noxious influences. The predisposition to the eruptive or exanthematous fevers continues, and there is also a frequent liability to epistaxis. The age of puberty is often attended with temporary constitutional derangement, especially in the female, in whom disorder of the uterine functions is common.

From the age of puberty till the time when growth ceases, is a dangerous period, there being a strong predisposition to hemorrhages, tubercular disease, scrofula, and disorders of the digestive organs.

After maturity there is again a period of comparative exemption from morbid tendencies, the functions being well balanced, and the actions of each organ well regulated. In females there is a tendency to disease of the reproductive system about the time of the cessation of the catamenia—from the forty-sixth to the fiftieth year; and in both sexes, as age advances after the fiftieth year, there is decrease of strength, disturbance of certain functions, a tendency to degeneration of tissues, and loss of power in different organs. Hence there is a predisposition to various organic diseases; the brain, heart, and the genital and urinary organs being especially prone to suffer. As senility advances sensibility decreases, the memory fails, the muscular strength becomes diminished, and gout, apoplexy, paralysis, softening of the brain, &c., often supervene to hasten the period of second childhood to its close.

3. Hereditary Tendency.—As the child often resembles the parents in form and feature, so frequently does he inherit their constitutional peculiarities, and the morbid tendencies growing out of them. It is not, generally speaking, diseases that are inherited, but only those peculiarities of structure or constitution which predispose to them. Thus children are not born with phthisis, gout, rheumatism, calculus, &c., but only with those conditions of system which favor the development of these affections when other causes co-operate. It sometimes happens, however, that the hereditary tendency is so strong, that the disease becomes developed notwithstanding the greatest effort to prevent it, as is often seen in affections of the lungs and brain. Where there is a predisposition to disease, the time at which it appears depends generally on the

nature of the disorder. Thus the disposition to convulsions, hydrocephalus, idiotcy, and scrofula is most apparent during the early periods of life; to epilepsy and phthisis about the age of puberty; to gout, rheumatism, and various nervous disorders, during the years of maturity; and to cancer, asthma, and paralysis at advanced stages of life. The inheritance may proceed from one parent only, or from both. In the former case the disposition is often slight, and with care the offspring frequently escapes from any manifestation of the affection; in the latter, the chances of safety are greatly diminished. Hence the danger of intermarriages between relations, who may be supposed to have the same defects of constitution.

4. Temperament and Idiosyncrasy.—There are few individuals possessing an organization so well constituted but that they show some inequality of function, or some peculiar susceptibility, or constitutional state favoring a particular class of morbid actions. These peculiarities when affecting classes of persons are called *temperaments*, when individuals, *idiosyncrasies*. Thus the *sanguine and irritable temperament*, in which excitement is easily produced, the circulation active, and the passions strong, disposes to plethora, congestions, inflammations, hemorrhages, and fevers of an inflammatory character; the *lymphatic or phlegmatic temperament*, which is characterized by a languid circulation, softness of the muscles, and torpidity of the bodily and mental functions,—to chronic diseases, debility, tubercular, scrofulous, and dropsical affections; while the *nervous temperament*, in which the cerebro-spinal system is peculiarly excitable, the circulation feeble, and the moral susceptibilities acute, predisposes to convulsive diseases, disorders of the nervous system, insanity, and melancholia: and the *bilious temperament*—characterized by decision of character, energy, and a capability for great physical and mental exertion,—to dyspepsia, hypochondriasis, and disordered action of the liver.

Sometimes, indeed generally, the temperaments are mixed, two or more existing in combination—as the *sanguineo-bilious*, when there is a tendency to inflammatory hepatic affections, to inflammations of the intestinal canal, &c.

5. Diathesis.—A strong predisposition—either hereditary or acquired—to certain diseases is not uncommon. The principal diatheses are the gouty, rheumatic, cancerous, tubercular, and strumous. To refer to an illustration which I have before employed, let us suppose five or six people to be exposed to wet and cold. Of these one or two may escape

without any harm, one or two may merely suffer from simple catarrh, but an individual of a rheumatic diathesis will most probably suffer from an attack of rheumatism, while pulmonary consumption may be induced in the person afflicted with the tubercular diathesis.

Patients in whom certain deposits habitually occur in the urine with corresponding constitutional disorder, are often said to be of, or to suffer from, a lithic acid, or phosphatic, or oxalic acid diathesis.

6. Habit.—The habits of life, mode of living, and nature of occupation are amongst the most powerful predisposing causes of—or safeguards against—disease. Habitual intemperance, *fast* or luxurious living, indolence, and excesses of all kinds, as they sap the strength and impair the health, so they increase the danger of accidents and of serious affections; while the same effect results from the opposite extreme—from great privations, from too sedentary a life, from anxiety and distress of mind, and from over-fatiguing mental or corporeal employments. The habitual use of animal food in excess, especially when a counterbalancing amount of exercise is not taken, predisposes to inflammatory affections, to disorders of the primæ viæ, to gout, apoplexy, &c. A vegetable diet, on the contrary, leads to impoverishment of the blood, and its attendant diseases. Alcoholic drinks too freely employed, frequently excite plethora, paralysis, delirium tremens, and dropsy; while pulmonary disease, epilepsy, and insanity, often result from inordinate sexual intercourse. All these vitiated habits, moreover, by depressing the powers of life, predispose the system to receive any epidemic or infectious poison that may be prevalent, and to which it may be accidentally exposed; while by lowering the conservative powers of nature, the constitution is less able to bear up against the resulting diseases when developed.

In some instances the influence of habit is salutary, as we see in persons who become acclimated in malarious or otherwise unhealthy districts, and in those whose sensibility to cold and wet is blunted by habitual exposure. In the same way many systems become reconciled to the habitual use of certain classes of poisons—probably those only which are derived from the vegetable kingdom—as tobacco, opium, and alcohol, which even become sources of enjoyment, and apparently, to a certain extent, of health.

7. Climate and Temperature.—The influence of climate and temperature over disease, either in promoting, modifying,

or alleviating it, is now generally admitted by all practitioners of medicine.

The range of atmospheric temperature compatible with life is very extensive. Gibbon—after stating that the Roman soldiers, from their excellent discipline, maintained health and vigor in all climates—adds, that "man is the only animal which can live and multiply in every country, from the equator to the poles." It seems probable, however, that for this boasted privilege man is more indebted to the ingenuity of his mind than to the pliability of his body, being enabled by the former to raise up numerous barriers to protect his constitution from the deleterious effects of extreme heat or cold. The fact is at least certain, that a mode of living essential to health in the northern regions, will prove rapidly destructive at the equator, and *vice versâ;* though it is worthy of notice that greater care is necessary to preserve life under very great cold than under intense heat.

The power which man possesses, under certain circumstances, and for a short time, of enduring a much greater degree of heat than the atmosphere ever attains in any part of the world, is very remarkable. Boerhaave's idea—deduced from experiments on animals—that the blood would coagulate in the veins at a temperature slightly above 100° Fahr., has long since been disproved. MM. Duhamel and Tillet, making some experiments on heat in 1760, found that a girl could enter an oven and remain in it some ten minutes with the thermometer at 288° Fahr., being 76° above the boiling-point of water. Drs. Fordyce and Blagden, occasionally naked and occasionally with their clothes on, entered and remained for some time in rooms heated to 240° and 260° Fahr., with but little inconvenience, although the same air which they respired sufficed to cook eggs and beefsteaks.

It would appear, from the remarks of several observers, that either extreme of heat or cold is better borne than any sudden change in temperature, though such changes are by no means so destructive to health as is commonly imagined. Thus Dr. Walsh states, that sailing along the coast of Brazil, after enjoying a temperature of 72°, the wind rose, and the thermometer fell to 61°, when "the sense of cold from the sudden transition of temperature was quite painful. After bearing it for some time shivering on deck, it became intolerable, and we all went below, put on warm clothing, and dreadnoughts—and again appeared with thick woollen jackets and trousers, as if we had been entering Baffin's Bay, and not a harbor under one of the tropics." A curious instance of inconvenience

from a rise in temperature is related by Captain Parry, who says that when in the Arctic regions the thermometer suddenly rose from 13° below zero to 23°—or 9° below the freezing-point,—when every one complained of the temperature being much too high to be agreeable.

The first effect of *extreme heat* is on the organic functions of the body, which become greatly stimulated, while the animal functions are depressed. The action of the heart becomes accelerated, the pulse increases in frequency, the biliary secretion is augmented—but deteriorated, and the skin perspires freely. On the other hand, there is nervous depression, with languor, lassitude, and an incapacity for mental or bodily exertion.

The ill effects upon Europeans of residence in tropical climates—where the thermometer often ranges from 80° to 100° or even 110° Fahr., or higher,[1]—are soon seen in the liver, causing an increase in the biliary secretion; this gland being maintained in a state of undue excitement, both from the stimulating influence of the heat, and the additional duty which it has to perform in the elimination of carbon. Hence —as occurs in every organ stimulated to undue action—one of two things occurs. Either—the cause being constant and long maintained—serious injury accrues to the organ itself, generally to the extent of structural alteration; or—the cause being only temporary—torpor or exhaustion of the gland takes place, and in the performance of its functions it falls short of the healthy standard; in either case producing great constitutional disturbance. Another primary effect of a hot climate is seen on the cutaneous surface, in promoting perspiration, and also in giving rise to a morbid condition—attended with pricking, tingling, and itching sensations—in which the skin is generally covered with an eruption of vivid red pimples. This disease, known as the prickly heat—lichen tropicus—makes a tropical life for a time miserable, since it causes irritation at the most unseasonable hours, for weeks together.[2]

The *coup de soleil*, or sun-stroke, not uncommonly affects individuals exposed to the direct beams of a hot sun, causing insensibility, and frequently death. Examples of it are frequently seen among the troops during long marches in India.

The individuals most benefited by a residence in the tropics are those of a strumous habit, as well as those of a tubercular

[1] The mean temperature of the London atmosphere is 50½° Fahr.
[2] Johnson and Martin on Tropical Climates.

diathesis in whom pulmonary disease has not actually declared itself.

The effects of *extreme cold* are first shown in causing depression of the organic functions, as is seen in the dwarfish size of men and animals in cold regions, the shrinking of external parts, the diminished cutaneous circulation, the contraction of the skin around the hair-bulbs and sebaceous follicles —producing the peculiar appearance known as *cutis anserina*, and in the diminished power of the sexual organs. Long and unprotected exposure to extreme cold gives rise to torpor of the nervous system, confusion of the intellect, a staggering gait resembling that from drunkenness, and to an overpowering desire for sleep, which, if indulged, almost inevitably proves fatal. Cold proves more injurious, and is less easily borne, when applied by a wind or current of air, as well as when accompanied by moisture, than when the atmosphere is dry and at rest. Diseases of the pulmonary organs are the most common affections of cold climates.

In *temperate latitudes* there is a less exclusive tendency to disease of any special organ than in climates nearer the poles or the equator; although, owing to the sudden vicissitudes of temperature, the frequency of cold winds, and of moisture, there appears to be a morbid tendency to inflammatory, rheumatic, and catarrhal affections.

CHAPTER V.

ON THE SYMPTOMS AND SIGNS OF DISEASE.

Without a correct knowledge of symptomatology or semeiology—the science which treats of the symptoms and signs of disease—we can know but little of the art of medicine; since a thorough acquaintance with the structural and functional disorders to which the human body is liable, essentially comprises a recognition of existing symptoms and signs, a proper appreciation of their value, source, antecedents, causes, relations, and connections with each other, and the results which may be expected to flow from them singly or in combination. The importance of carefully studying the symptoms, therefore, can hardly be over-estimated, for from them we form our diagnosis and prognosis, and learn in what direction to conduct the treatment. It follows necessarily that he will prove the best physician who is the most sagacious in observing them, and in deciphering their import and true value.

What, then, it may be asked, is a symptom? I cannot do better than reply in the words of Dr. Watson, who says—"Everything or circumstance happening in the body of a sick person, and capable of being perceived by himself or by others, which can be made to assist our judgment concerning the seat or the nature of his disease, its probable course and termination, or its proper treatment: every such thing or circumstance is a symptom."[1] It thus appears that *symptoms* are obvious to all persons alike, to the educated as to the uneducated, in this respect differing from the *signs* of disease, which are—generally speaking—intelligible to the medical eye alone. Signs indeed are, for the most part, deduced from symptoms, either from one symptom or from a combination. Thus cough is a symptom of many laryngeal and thoracic affections; but combined with a hooping noise during inspiration it becomes a sign. Symptoms have been aptly compared to words taken separately or put together at random; arranged in due order, put together in sentences, they convey a meaning, they become signs.

Various divisions of symptoms have been made, which are neither very philosophical nor of much practical utility. It is necessary to mention, however, that authors speak of symptoms as *local*, *general*, or *constitutional;* as *idiopathic*, when proceeding directly from a primary disease; *symptomatic* or *secondary*, when due to secondary disorders, or those produced by the primary affection; *premonitory* or *precursory*, or symptoms which indicate an approaching disease; of symptoms which are *diagnostic*, since they enable us to distinguish disorders which might otherwise be confounded; or of those which are *prognostic*, because they denote the probable issue of a case; or *therapeutic*, since they indicate the treatment. Moreover, those diagnostic symptoms which are peculiar to one disease are called *pathognomonic*, or *pathognostic*. When authors speak of *physical signs*, they allude to those phenomena which take place in the body in accordance with physical laws; when of *vital symptoms*, to such as depend on the vital properties of a part or parts of the body, as irritability, tonicity, sensibility, &c.

It may almost appear unnecessary to mention that in the study of semeiology every circumstance which is at all characteristic is important; and that the form and violence of the symptoms, the particular order in which they appear, and the manner in which these signals of disease are conjoined, merit especial attention.

[1] Op. cit. vol. i, p. 111.

We would now proceed to the proper subject-matter of this chapter, according to the following arrangement:—1. The symptoms and signs afforded by the countenance, and the general appearance and condition of the body; 2, those symptoms and signs belonging to the organs and function of digestion; 3, those belonging to the function of respiration; 4, those belonging to the function of circulation; 5, those connected with the urinary and sexual organs; and 6, those derived from the nervous system.

SECTION 1. SYMPTOMS AND SIGNS AFFORDED BY THE COUNTENANCE, AND THE GENERAL APPEARANCE AND CONDITION OF THE BODY.

The manifestations of disease which have to be considered in this section are those derived from the expression of the countenance, from the eye and the function of vision, from the sense of hearing, and from the posture, and the general condition of the body.

The Expression of the Countenance.—The facial expression is of importance in the recognition, diagnosis, and prognosis of most maladies, but especially perhaps in those of young children.

When the *general expression* of the countenance is serene, tranquil, or expressive of hope, it may generally be regarded as of favorable import in disease, especially if such expression supervene gradually on the disappearance of restlessness and acute symptoms generally; it must be remembered, however, that it may be—though it is so rarely—an unfavorable sign, as when it occurs suddenly during the progress of severe organic disease on the unexpected cessation of pain, when it frequently indicates gangrene of the affected organ, or paralysis. In chronic disorders, unattended with pain or suffering, and in the low stages of fever, the countenance is often indifferent, the look is partly fixed, and the eyes bright. In the low stage of fever, however, the movements of the lips are tremulous, and the lips themselves are covered with sordes and with a brown or black coating, like that on the teeth and tongue. Immobility of the features may generally be looked upon as a sign of debility, or of loss of consciousness, or of general tonic spasms—as catalepsy.

Anxiety and pain produce a characteristic change in the features. At the commencement of acute diseases generally, in spasmodic affections, asthma, angina pectoris, &c., in inflammations of important viscera, in disorders of the genera-

tive organs, and in hypochondriasis, the countenance assumes an anxious air; a peculiar mixed expression of anxiety and resignation is also common in organic diseases of the heart, and of the great vessels. The expression of terror or of great fear, is observed chiefly in delirium tremens, in hydrophobia, in certain forms of insanity, during or after hemorrhages, and after accidents. So the expression of rage occurs for the most part in inflammation of the brain, in hydrophobia, and in insanity. A bashful, downcast countenance, with inability to look one manfully in the face, is generally a sign of nervous exhaustion from masturbation, and often of impotency. That peculiar cast of countenance termed the *Hippocratic* is thus described by Hippocrates: "The forehead wrinkled and dry; the eye sunken; the nose pointed, and bordered with a violet or black circle; the temples sunken, hollow, and retired; the ears sticking up; the lips hanging down; the cheeks sunken; the chin wrinkled and hard; the color of the skin leaden or violet; the hairs of the nose and eyelashes sprinkled with a yellowish-white dust." Such is the alteration in the human physiognomy which usually precedes death, or which may be produced by intense anxiety, grief, or sudden fright, or by long-continued want of sleep: in all cases it renders the prognosis very unfavorable.

But of all the appearances presented by the countenance, that caused by *facial paralysis* is the most striking and peculiar, since from one-half of the face all power of expression is gone; the features are blank, still, and unmeaning; the paralyzed cheek hangs loose and flaccid; and the face is drawn on one side, the healthy side being that so drawn, owing to the action of the sound muscles not being counterbalanced by the play of those on the affected side. "The patient," says Dr. Watson,[1] "cannot laugh, or weep, or frown, or express any feeling or emotion, with one side of his face, while the features of the other may be in full play. One-half of the aspect is that of a sleeping or of a dead person, or stares at you solemnly; the other half is alive and merry. The incongruity would be ludicrously droll, were it not so pitiable also, and distressing. To the vulgar, who do not comprehend the possible extent of the misfortune, the whimsical appearance of such a patient is always a matter of mirth and laughter." Happily, however, there is not in the greater number of cases any cause for real alarm; protracted cold, or some external injury or wound to the facial nerve—the portio dura of the seventh pair—or pressure upon this nerve by an enlarged

[1] Op. cit. vol. i, p. 548.

parotid gland, being often the exciting cause of the complaint. In slight cases of hemiplegia the face is often unaffected, the paralysis being confined to the upper and lower extremities of one side; sometimes, on the contrary, however, the face is the part first affected, the motor portion of the fifth nerve being more or less involved in, or influenced by, the paralyzing lesion. In such cases, the motions of the jaw on the affected side are impaired, and mastication is impeded; but unless the portio dura is also involved there is little or no distortion of the features, and no loss of expression. The disease of the motor portion of the fifth pair may be seated in or near the origin of the nerve in the brain, or, more rarely and more favorably, in the course of the nerve; when there is loss of sensibility also, the sensitive branches of the fifth pair are likewise implicated.

The appearance of the *lips and mouth* alone, often gives valuable aid in diagnosis. Thus, retraction of the corners of the mouth, so as to produce the sardonic grin—risus sardonicus—is very remarkable in inflamation of the diaphragm, and in certain painful affections of the stomach and bowels. So in the last stage of phthisis, or of hectic from exhausting diseases, or of cancer, the thin, retracted appearance of the lips, as if they were stretched over the gums, is peculiar. Swelling of the lips often occurs in children suffering from intestinal worms, and in incipient phthisis; in strumous subjects the upper lip is generally enlarged. After hemorrhage, in anæmia, and in diseases of the uterine organs, the lips are pallid, and at the same time inclined to crack, and become sore; so on the contrary, they present a purple hue, when, from any cause, the blood is imperfectly arterialized, and when there is congestion of the thoracic viscera.

The *hue or color* of the countenance should be noticed. A pallid or anæmic tint attends all diseases caused by, or giving rise to, poverty or thinness of the blood, with a deficiency of the red corpuscles; a generally diffused redness of the face attends inflammatory fevers in their early stages; a dark, murky tint shows a morbid condition of the circulating fluids; a continued sallowness is common in diseases of the liver, with insufficient secretion of bile, as well as in diseases of the spleen; jaundice is caused either by some impediment to the flow of bile into the duodenum and the consequent absorption of the retained bile, or by defective secretion on the part of the liver, so that the principles of the bile are not separated from the blood; a blue, leaden tint is seen in cases of malignant cholera; while the face becomes livid, in obstructive diseases of the heart or great vessels, in general acute bron-

chitis, in the last stage of pneumonia, and in congestion of the lungs.

A dark circle under and around the eyes is often observed in females suffering from ovarian or uterine disorder, menorrhagia, prolonged leucorrhœa, or who practise masturbation. It is not uncommonly present also in connection with severe organic diseases, especially perhaps when they are of a malignant character.

Puffiness or œdema of the eyelids is frequently seen in the early stages of dropsy, dependent upon cardiac or renal disease; *closing of the eyelids* takes place from intolerance of light, vertigo, or swelling; *a falling of the upper lid*—ptosis—caused by a paralysis of the third nerve, may be due to merely local causes, as rheumatism, injury, &c.,—or it may be the consequence of cerebral disease, as apoplexy, concussion of the brain, and so on,—or it may be the precursor of an attack of hemiplegia; and lastly, *a frequent tremulous movement of the lids* is observed in chorea, epilepsy, hysteria, and in catalepsy towards the end of the paroxysm.

Signs presented by the Eye.—The eye may be increased in size from hyperæmia of its tissues, such as takes place in impending suffocation, or in congestion of the brain, heart, or lungs; it also becomes more prominent, and therefore apparently increased in size, in convulsions, apoplexy, epilepsy, and delirium tremens. Ecchymosis—or swelling of the conjunctiva—is common in catarrh and many simple affections; but enlargement of the whole organ takes place only in hydrophthalmia, or dropsy of the vitreous humor, and especially in medullary cancer, in which the eye becomes extruded from the cavity of the orbit as the disease advances.

The *position* of the eye, as regards prominence or sinking, demands attention. Thus protrusion may occur from enlargement of the eye—as just noticed, from tumors developed behind it, from inflammation and turgidity of the surrounding tissues, from enlargements of the lachrymal gland, from aneurism, exostosis, or disease of the periosteum. Sinking of the eye is, on the contrary, a sign of atrophy of the parts behind the eyeball, and is seen in phthisis, in malignant and all wasting diseases, after long fasting, or hemorrhages, or violent evacuations, and fevers. As a rule, both eyes are equally sunk: if only one be so, some local affection of the brain, or paralysis of the optic nerve, is the probable cause.

The *color* of the eye should not be disregarded. Redness of the conjunctiva is a symptom either of congestion and inflammation of this tunic, or of congestion or inflammation of the brain or its membranes. In conjunctivitis,

the enlarged vessels are seen generally of a bright scarlet color, irregularly arranged over the whole of the membrane; when the vessels present a dirty brown appearance, a vitiated state of the blood exists, and the prognosis is unfavorable. The redness produced by inflammation of the sclerotic is very characteristic, the turgid vessels being arranged regularly in a radiated or zonular form, the radii running towards the edge of the cornea; the vessels are smaller, also, than in inflammation of the conjunctiva, and are seen to lie beneath the membrane. Sclerotitis is generally due to injury, or to severe catarrh, occurring in subjects predisposed to—or suffering from—rheumatism. In iritis there is discoloration of the iris, —if naturally blue, it becomes greenish; if dark-colored, of a red hue,—with contraction, irregularity, and immobility of the pupil; there is also dimness of vision, sometimes amounting to blindness; pain, which is especially severe around the orbit at night; and unless care be taken, adhesions are very likely to form between the pupillary edge of the iris and the capsule of the lens. A red or dirty gray turbidity at the bottom of the eye indicates disease of the retina, and often disease of a malignant character; change of color from a clear white to a thick yellow tint in the crystalline lens is a sign of cataract; while a greenish discoloration of the pupil is the pathognomonic sign of glaucoma.

The circumference of the cornea often undergoes a remarkable change in individuals about the age of forty-five or fifty—it is very rare before middle age—when, instead of presenting that translucent appearance so characteristic of its perfect state, it loses its lustre, and becomes opaque. This change, so well known as the *arcus senilis*, comes on gradually, without pain, and without giving rise to any loss of function; it also occurs simultaneously in both eyes, except in cases where local disease or injury may have materially impaired the nutrition of only one organ. We are indebted to Mr. Canton for the discovery that this senile arc is due to fatty degeneration of the edge of the cornea, and for the still more important observation that it may be regarded as indicating a similar state of decay in important internal viscera, as the heart, the liver, the kidney, the muscles, the coats of the small blood-vessels of the brain, lungs, &c. "I have in no instance," says Mr. Canton,[1] "found the senile arc, when well developed, unaccompanied by fatty degeneration of the heart. The extent of degeneracy has appeared to me to bear a relation to the degree in which the cornea was invaded by the deposit."

[1] Lancet, 11th January, 1851.

This statement must be received, I believe, with some reservation, but that it approximates rather closely to the truth, most practitioners allow; and I would say, therefore, that I should fear the conversion of other tissues into fat, and their consequent death—so to speak, and that life's forces altogether were more spent than other appearances might indicate, in any individual whose corneæ presented well-marked senile arcs. If in addition to the arcus senilis the pulse was feeble and slow—below 50, and if the affected individual suffered also from repeated attacks of syncope, I should be inclined to diagnose fatty degeneration of the muscular fibres of the heart.

The *size of the pupil* possesses some diagnostic importance. A contracted pupil is observed in congestion of the brain, in inflammation of this organ or of its membranes, in some unfavorable cases of apoplexy and epilepsy, in hydrocephalus, in inflammation of the retina, and in poisoning by opium. A dilated pupil—when not due to an obstruction to the entrance of the rays of light, as by cataract or other causes—is indicative of some disease of the brain, attended with effusion and pressure, as apoplexy, the advanced stage of hydrocephalus, &c.; or of some sympathetic cerebral disturbance from gastric or intestinal irritation; or of amaurosis; or of the action of belladonna, or a poison of the same class. When, during the progress of any cerebral affection, dilatation follows rapidly upon contraction of the pupil, the occurrence of effusion or some organic change is to be feared, especially if only one pupil be so affected.

The *lustre* of the eye is generally diminished at the commencement of acute diseases, in all infectious and pestilential maladies, after exhaustion from any cause, and in all affections where the nervous system is greatly debilitated. It is increased in the early stage of cerebral inflammation, in delirium, and in many forms of insanity, especially acute mania. A glazed appearance of the eyes is common before death.

The *function of vision* is early affected in some disorders. Photophobia—increased sensibility to light—is observed in diseases where the sensibility generally is exalted, as hysteria; in irritation or inflammation of the brain; in inflammation of the different textures of the eye; and in scrofula. In commencing disease of the brain, or of the optic nerve (leading to amaurosis), one of the earliest symptoms is generally indistinctness of vision—amblyopia; or objects appear double—diplopia; or only one half of a figure can be distinguished at a time—hemiopia. In the same cases, scintillations, or

sparks or flashes of fire—photopsia—are seen; or the patient complains of dark spots, or black figures, or flies—muscæ volitantes—floating in the air.

Lastly, *squinting*, when congenital or acquired by habit, is of no importance as regards diagnosis or prognosis; but when it occurs in cerebral inflammation, apoplexy, or indeed in the course of any disease of the brain, it must be regarded as of very unfavorable import. In paralysis of the third nerve—which, it may be observed, is often a precursor of hemiplegia—there is generally, in addition to a falling of the upper eyelid, squinting of the eyeball outwards.

The Sense of Hearing.—Preternatural acuteness of the sense of hearing sometimes precedes delirium and affections of a spasmodic character, especially epilepsy and tetanus; when it occurs during the progress of severe diseases, the prognosis is rendered suspicious, to say the least. The opposite fault—obtuseness of hearing—is more common, and generally of less significance; when it occurs in continued fever, in the exanthemata, &c., as it often does, it is not a symptom of much moment. With the deafness depending upon some physical imperfection in the organ of hearing, the physician has but little concern, it is only in instances in which it has a deeper origin that his attention is excited. In organic cerebral diseases especially, the occurrence of deafness must be regarded as an unfavorable sign; such is also the case in concussion of the brain, and in epilepsy.

A depravation of the sense of hearing, consisting of peculiar ringing noises in the ears—tinnitus aurium—often results simply from excitement of the imagination, and from too strong throbbing of the arteries about the temple; congestion of the cerebral vessels and morbid states of the brain of every kind will also produce it. When more or less constant, and of course supposing it to be independent of disease of the ear or closure of the Eustachian tube, it has been regarded as a sign of degeneration of the vessels of the head, and it may then prove the precursor of apoplexy, or paralysis, or—more fortunately—merely of epistaxis. Phenomena of a similar kind are often complained of by aged persons of both sexes who omit taking exercise in the open air; and by women suffering from nervous exhaustion, anæmia, or disease of the uterine organs. These annoying sounds are variously compared to the rushing of the wind, the hissing or singing of a tea-kettle, the beat of a drum, &c.

The Posture and General Condition of the Body.—Inability to stand results from weakness in a great number of

acute and chronic diseases. It may, however, be the consequence of disease of the joiuts or bones of the lower extremities, or of paralysis, or of vertigo, as at the commencement of many acute fevers. Inability to lie down—the necessity of assuming the sitting attitude—is an important indication in many disorders of the thoracic viscera. It is often hardly possible to relinquish the sitting position in simple dyspnœa, asthma, severe bronchitis, advanced phthisis, pleurisy with copious effusion, pneumonia, and in many instances of organic disease of the heart. In less urgent examples of these affections the sufferer obtains ease in a semi-supine posture, the shoulders and head being elevated by pillows. In extreme cases of asthma, the patient is often obliged to lean forwards, and place his elbows or arms on the window-ledge, in order to procure a fixed point for a stronger contraction of the muscles of respiration.

A constantly retained position on the back is common in low fevers, and in the last stage of acute maladies, when the vital powers are thoroughly exhausted; there is often at the same time unconsciousness, or coma, or low muttering delirium, indicating extreme exhaustion of organic nervous power. When the position is long retained, great attention to cleanliness, and a water-bed or cushion, will be required to prevent ulceration and gangrene of the skin over those parts of the back most pressed upon.

The supine position, with the knees drawn up, so as to relax the abdominal integuments, indicates peritonitis, or, less frequently, inflammation of some of the viscera within the abdomen. Lying on the abdomen, and tossing from the prone to the supine posture, is observed in severe colic, during the passage of gall-stones, &c.

A quiet position in lying down, with perfect consciousness and strength, is a favorable sign in disease, showing that the morbid processes are terminating. In acute rheumatism, however, the patients lie quiet, owing to the pain caused by any movement. A restless mode of lying down yields an unfavorable prognosis in thoracic inflammations, in rheumatism, and in most organic diseases. Lying on the right side is often preferred in health, and especially in pneumonia of the right lung, or in pleurisy with effusion of the same side, after the acute and more painful symptoms have subsided. Patients wish to lie on the left side in many organic diseases of the heart, sometimes in aneurism of the thoracic aorta, and in pneumonia or pleurisy of this side with effusion, after the pain has ceased. In the early stages of pleurisy of

either side the affected person mostly lies on his back, with an inclination perhaps toward the affected side.

The *nutrition of the body* should always attract attention. When there is emaciation, and it is rapidly increasing in degree, we may feel certain of the existence of severe constitutional disorder. In organic diseases of the lungs, heart, or digestive organs, emaciation is always present: so also in those affections attended with morbid discharges, as well as in low, continued, remittent, and hectic fevers. A redundant flow of milk—galactia—in women who are suckling, will give rise to wasting. When some of the secretions are so increased as to be exhausting, they are spoken of as colliquative, as colliquative sweats, colliquative diuresis, &c. Arrest of the progress of emaciation, and a more or less marked restoration of the flesh, is always a very favorable symptom, especially if at the same time there be an increase in strength. A sudden tendency to become corpulent, without any change in the habits and mode of living, must be viewed with some suspicion, such tendency being often a forerunner of apoplexy. Care must be taken not to confound increased size occasioned, by the deposition of fat, with serous infiltration and emphysema.

Serous infiltration of the face and of the upper extremities is a result of disease of the heart or lungs, rather than of the abdominal viscera, although one of the earliest circumstances which attracts attention in Bright's disease is frequently œdema of the face. Œdema of the lower extremities indicates some difficulty in the return of blood to the centre of the circulating system, and is therefore most frequently met with in diseases of the liver, heart, or spleen, or in renal affections, or in cases where ascites or abdominal tumors disturb the circulation. In acute diseases with great debility, and in anæmia, partial œdema of the lower extremities and of the feet often occurs, without rendering the prognosis unfavorable, since it rapidly disappears upon the employment of appropriate treatment.

Coldness of the surface of the body often attends sinking of the general strength, and when extreme and attended with cold sweats, generally teaches that the fatal stage of disease is approaching; this is well seen in the state of collapse in cholera. Chilliness, shivering, horripilation, or rigors, with a remarkable feeling of coldness along the spine, usher in most of the febrile and inflammatory affections, just as increase of heat follows on the reaction of the vascular system. Shivering, when it occurs in intermittent fevers, is not a dangerous

symptom: when it takes place during the course of inflammations, suppuration is to be dreaded. Rigors also, at the height of such acute diseases as are associated with great depression, stupor, or cold sweats, are bad; they are much less unfavorable when followed by heat.

A harsh, dry, burning heat of the body is always unfavorable, but especially so in inflammatory affections of important viscera; if at the same time a sense of internal heat is experienced, with coldness of the feet and lower extremities, restlessness, and anxiety, there is a great fear of a rapidly approaching fatal termination.

A perspirable condition of the skin is, in the majority of cases, a favorable symptom, and more so when it arises naturally than when due to medicine. On the supervention of the sweating stage in ague, remarkable relief is experienced, as occurs generally in most fevers, inflammations, and especially in rheumatic fever.

SECTION 2. SYMPTOMS BELONGING TO THE ORGANS AND FUNCTIONS OF DIGESTION.

The symptoms and signs furnished by the digestive functions and organs comprise those evinced by the teeth and gums, by the saliva, by the tongue, by the taste, by deglutition, by the appetite, by jaundice, by nausea and vomiting, and by defecation.

The Teeth and Gums.—In persons of good constitution the *teeth* are often found sound and perfect until an advanced period of life; their early decay indicates either prolonged disturbance of the function of digestion, or loss of constitutional strength, or constitutional vice, or the abuse of powerful medicines, as acids and mercurials. They become loose in scurvy, purpura, and in mercurial salivation; while improper diet—especially the abuse of spirituous liquors, of acids, and perhaps of sugar, renders them carious at an early age. In low fevers they become covered with mucus and sordes of a dark brown color, the extent of the sordes increasing with the depression of the vital powers. The accumulation of tartar round the teeth is said to show a disposition to calculous and gouty affections. *Chattering* of the teeth occurs in the early stages of catarrh, fever, and acute inflammations generally; it is most marked in the cold stages of agues. *Grinding* of the teeth during sleep is common in irritable persons, and in children during dentition, or when suffering from intestinal worms, or from cerebral disease.

The *gums* are pale in anæmia, in most exhausting diseases, and after copious bloodletting. They are soft and disposed to bleed in scurvy, and in cancrum oris. They become red, spongy, and swollen in purpura, diabetes, salivation, and in dyspepsia of long continuance. In lead poisoning they present a blue margin; a valuable symptom pointed out by the late Dr. Burton as pathognomonic of the contamination of the system by this metal.

The Saliva.—Increased secretion of saliva—salivation or ptyalismus—may occur from the use of certain medicines, as mercury, iodine, and antimony; from disease of the stomach, liver, or pancreas; and from any cause which can irritate the parotid, submaxillary, or sublingual glands, or the mucous membrane of the mouth, as dentition, aphthæ, small-pox, pustules, glossitis, tonsillitis, &c. In epilepsy, hydrophobia, and occasionally in apoplexy, the saliva is also increased in quantity, and frothy; while at the commencement of most acute disorders there is diminution, with thickening of it.

The Tongue.—The general indications afforded by the tongue are most important, since it not only sympathizes with the different parts of the alimentary canal and the organs connected with it, but more or less with the whole system.

The mode of protruding this organ deserves attention. When in acute febrile diseases its movements are not under the patient's control; when, upon being requested to put out the tongue, there is inability to do so; or when the organ trembles much in the attempt, there is either great prostration, or some exhausting nervous disorder, or dangerous cerebral disease. Under the same circumstances, a difficult, hesitating mode of speaking, resembling stammering, is very unfavorable. Slight paralysis of the muscles of the tongue, giving rise to indistinctness of speech, is not unfrequently the forerunner of general palsy. In chorea, the manner of suddenly protruding and as rapidly, withdrawing the tongue is very peculiar. In cases of facial paralysis, and especially in hemiplegia, when the ninth nerve is influenced by the paralyzing lesion, the tongue will be protruded towards one side, and generally towards the affected half of the body; this is owing to the muscles which protrude this organ being paralyzed on that side, and in full force on the opposite, so that the strong muscles prevail and push the tongue to the weakened part.

The bulk of the tongue may be increased or diminished. It may become enlarged from inflammation, or as a result of small-pox, scarlatina, syphilis, or the action of mercury or

poisons. Chronic hypertrophy sometimes takes place without any appreciable cause. When the enlargement of this organ is not sufficient to be very obvious, it may be frequently recognized by the appearance of indentations on the sides, caused by the pressure of the teeth: at the commencement of salivation such an appearance is common. Actual diminution in the size of the tongue is rare; when it occurs it is probably due to a deficiency in the quantity of the blood, or to feebleness of the heart's action.

The condition of the tongue as to *dryness and moisture* is often significant. Dryness may exist in different degrees. It depends on a deficiency of saliva, or of mucus, and indicates a general tendency to diminished secretion; it is most common in continued fevers, in the exanthemata, in inflammation of the abdominal viscera and the serous membranes, and in many other diseases of an acute and febrile nature. When the tongue, after having been furred and loaded, becomes dry, rough, hard, and dark-colored, a state of great and most dangerous prostration is indicated, with contamination of the blood, and suppression of the secretions. Humidity or moisture of the tongue is generally a favorable symptom, especially when it supervenes upon a dry or furred condition. In acute disorders the humidity first appears at the sides, and gradually extends: this change is usually accompanied with a diminution in the severity of the general symptoms.

The *color* of the tongue is often changed from the natural healthy hue. A pale color is frequently associated with a similar appearance of the gums and lips, and is seen in anæmia, after loss of blood, in affections of the spleen, and during the progress of chronic disorders. A very red tongue occurs for the most part in inflammations of the palate, tonsils, and pharnyx, and in the course of the exanthemata; while in gastric and bilious fevers, and in severe dyspepsia, the redness is often limited to the tip and edges of the organ. When the blood is insufficiently aerated the tongue assumes a livid or purple color.

An *aphthous* state of the tongue is not uncommon in infancy, when it constitutes a special disease—the thrush—as well as in adults in the last stage of phthisis, and in several other severe visceral diseases when tending towards a fatal termination. Some forms of aphthæ are said to depend upon the copious development of microscopical parasitic plants—the *Leptothrix buccalis* and the *Oidium albicans*.

The *temperature* of the tongue is not often much affected. It is probably diminished in all diseases hastening to a fatal

termination: in the collapse of epidemic cholera the coldness of the tongue is always well marked.

But of all the conditions of this member, the most valuable as regards diagnosis, is that known as *furred* tongue. In this state the tongue is covered with a morbid coating, varying in length, thickness, and color, and somewhat resembling the pile on the surface of cotton velvets. A furred condition of this organ is common in inflammations, in irritation of the mucous membranes, in diseases of the brain and its membranes, in all the varieties of fevers, and in short, in almost all acute and dangerous maladies. The presence of a fur, however, is not always a sign of disease, since some persons habitually have a coated tongue, especially on rising in the morning, without any symptom whatever of disordered health.

When the fur is white, thick, moist, and uniform, it usually indicates an active state of fever, without inflammation of internal organs, and without any malignant tendency. When of a yellow hue, there is generally disordered action of the liver, with retention of bile in the blood. When brown or black, a low state of the vital powers is indicated, with contamination of the blood. In many instances the white fur of the tongue is modified by the tops of the red and swollen papillæ projecting through it, an appearance which is well seen in scarlet fever; as the fur clears away, these papillæ become more distinct, and give the tongue a strawberry appearance.

We may often learn much from the manner in which a furred tongue begins to clean. Thus it is a sign of a rapid and lasting convalescence when the fur slowly retires from the tip and edges, thinning gradually as it recedes. When it separates in flakes and patches, beginning at the middle or near the root of the organ, and leaving a smooth, red, glossy surface, the convalescence is apt to be more tedious and interrupted. Sometimes the fur recurs again and again before ultimately disappearing, especially in cases where the advance towards health is uncertain and unsteady. And lastly, when the crust is rapidly removed, and the exposed surface left of a raw appearance, or glossy, or fissured, or dark-colored, the prognosis is unfavorable.

The Taste.—The sense of taste is rarely rendered more acute than natural, though it is so occasionally in nervous affections, as hysteria, hypochondriasis, &c. It is often impaired in fevers, gastritis, gastro-enteritis, dyspepsia, catarrhs, and influenza: its early restoration in such cases is a favorable symptom. When lost from apoplexy, or some other cerebral disease, and when not restored during convalescence, a re-

lapse is to be dreaded. A vitiated taste is common in disorders of the digestive organs, in affections of the lungs, in diseases of the uterus, and in all nervous complaints: it may be insipid, as in catarrhs; or bitter, as in diseases of the liver; or saltish, as in phthisis; or putrid, as in gangrene of the lungs; or metallic, as is occasioned by the action of metals on the system, such as mercury, &c.

Deglutition.—This may be difficult—dysphagia; or impossible—aphagia. Both conditions may arise from enlargement of the tonsils, disease of the tissues, of the pharynx, or of the œsophagus, or from disease of the brain, medulla oblongata or their membranes, and from structural changes in the nerves distributed to the tongue, pharynx, or upper part of the œsophagus. When the result of functional nervous disorder, as in hysteria, it is generally accompanied with spasms in other parts, or with flatulent distension of the stomach, and a sensation as of a ball rising in the throat—globus hystericus; in such cases it is of little moment. The prognosis is more unfavorable when dysphagia occurs towards the termination of acute diseases, than when it does so at their commencement; when dependent upon paralysis or upon organic disease, it is also a very unfavorable symptom. Aphagia, unless caused by inflammation, is generally fatal.

The Appetite and Desire for Drink.—The appetite may be diminished, or increased, or depraved. The temporary loss of desire for food is one of the earliest results of disease, especially perhaps of fever, while its return is commonly one of the first evidences of convalescence. The perfect loss of appetite—anorexia—may depend upon the general disturbance caused by all acute diseases; or upon there being but little necessity for food, as in aged persons, and in those of weak constitution and sedentary habits; or upon malignant or chronic disease of the stomach or some other part of the alimentary canal; or upon functional derangement of the nervous system. Increased appetite—bulimia—more rare than the preceding, is occasioned either by an increased want of nutrition from excessive consumption of the living tissues or of the blood; or it may arise from irritation of the stomach, or from the irritation of worms in the intestines, or from disease of the nervous system. The existence of hunger during the progress of fever is generally considered a bad sign, as indicating great derangement of the nervous system. A voracious appetite with vomiting—the bulimia emetica of Cullen—is common in certain forms of inflammatory irritation of the pylorus or of the mucous membrane of the stomach, and in

hooping-cough. A vitiated or depraved appetite—pseudorexia or dyspepsia pica—sometimes occurs in children, often in the insane, and in pregnant, hysterical, and chlorotic women. It is generally symptomatic of altered sensibility of the nerves; or of a disordered condition of the gastric secretions dependent upon imperfect function; or of an irritated state of some organ related to the stomach, as the brain, uterus, ovaries, and large intestines.

The desire for drink is frequently morbidly excessive—polydipsia—and is often present when the appetite for food is completely lost. Thirst may arise from excitement or from depression; it accompanies most cases of inflammation and irritation, almost all diseases of the intestines, hemorrhages, and those disorders where the excretions are excessive—as diabetes, phthisis with profuse perspiration, simple and malignant cholera, &c. There is often the most pressing thirst for ice or cold water in fevers as well as in all malignant forms of disease attended with great prostration; for demulcent drinks in pulmonary affections; for vinegar or acidulous fluids in disorders of the uterine organs; and for alcoholic drinks in diseases of debility, and during the convalescence from fevers. In the majority of chronic maladies there is an absence of thirst.

Jaundice.—Icterus or jaundice, though often spoken of as a separate disease, is in fact only a symptom of disordered action of the liver. It may be produced in two ways: 1st, by some impediment to the flow of the bile into the duodenum, and the consequent absorption of the retained bile; and, 2d, by defective secretion on the part of the liver, so that the principles of the bile are not separated from the blood.

The most common impediment to the flow of bile into the duodenum is the impaction of a *gall-stone* in the ductus communis choledochus. These concretions consist of inspissated bile, and chiefly perhaps of cholesterine—a peculiar substance, which exists in a state of solution in healthy bile, but which, under certain circumstances, becomes released from its solvent, and assumes its natural crystalline form. In all cases the nucleus of the concretion consists of a small piece of solid biliary matter, or of inspissated bile cemented by mucus. When the obstructing stone or stones have passed into the duodenum they are voided with the fæces, and the cause of the jaundice being removed, the skin and conjunctivæ gradually assume their natural color, the fæces become dark instead of clay-colored, and the urine—from having been of a saffron hue—returns to its natural pale yellow tint.

The other causes of jaundice from obstructed gall-ducts are, cancer of the liver or pancreas, closure of the ducts from adhesive inflammation of the liver, from spasm of the ducts, and from constipation—the loaded intestine pressing upon the duct, and so impeding the flow of bile.

The secretion of bile may be suppressed or rendered defective by congestion and inflammation of the liver; by mental shocks, or grief, or dissipation; by certain poisons in the blood; and by many disorders of the stomach.

Nausea and Vomiting.—Nausea commonly precedes vomiting, and may be due to improper food, or to a disordered state of the digestive organs—especially the stomach, or to disease of the brain, or to some derangement of the nervous system. Disease of the gastric or intestinal mucous membrane, cancer of the stomach, obstruction of the intestines, peritonitis, nephritis, metritis, and most of the exanthematous fevers, are common causes of vomiting; when long continued, or when the vomited matters are fæcal, the prognosis is very unfavorable. Nausea and vomiting accompanying diseases of the brain or epilepsy, must be regarded as dangerous symptoms; on the contrary, when observed in pregnancy, hysteria, or hypochondriasis, no alarm need be excited, since they are merely symptomatic of irritation transmitted by the ganglionic nervous system to the stomach. When, in cases of encephalitis, nausea and vomiting are the earliest symptoms, observation has shown we may conclude that the inflammation has commenced in the cerebral pulp rather than in the membranes of the brain; when, on the contrary, the attack comes on with a sudden fit of convulsion, the inflammation has commenced in the arachnoid or pia mater. If considerable relief follow the vomiting, if the loathing and nausea, oppression of the chest and stomach, and headache disappear, the prognosis becomes much more favorable. If, on the contrary, the phenomena which preceded the vomiting increase after it, and especially if eructations, hiccough, and spasms ensue, we must be prepared to find that the disease has taken a dangerous turn. The sooner the vomiting occurs after eating, the higher up in the alimentary canal is the disease seated. Thus when it takes place within one hour of taking food, the disease will be found in the stomach; when after the lapse of two or three hours, in the pylorus or duodenum; and after a long interval, in the large intestines. *For the examination of the vomited matters, see Chapter XI, Section 3.*

Defæcation.—The examination of the intestinal evacua-

tions should but seldom be omitted in any case, and never in obstinate and severe diseases. A patient will often assert that the bowels are open daily, when the evacuation is very scanty, and quite insufficient to prevent a large fæcal accumulation. Besides ascertaining the existence or non-existence of constipation, the practitioner should ascertain the color of the stools, their consistence, and nature.

The frequency of the evacuations will vary with the age and mode of living: children at the breast evacuate the bowels several times in the day; adults once; and old people, and those of sedentary habits, more rarely. Diarrhœa at the commencement of an acute inflammation of some organ not belonging to the chylopoietic system, is generally an unfavorable symptom, as well as when relaxation of the bowels sets in with collapse. If, however, the diarrhœa is followed by alleviation of the general symptoms, and if the strength increases, the prognosis is good. Tenesmus, or a constant desire to go to stool, with pain and inability to pass an evacuation, is a common symptom of dysentery, or of some irritation of the rectum—such as arises from worms, hemorrhoids, calculus of the bladder, retroflexion of the uterus, &c.

Constipation may arise from a general morbid state of the intestinal canal, such as is often produced by the habitual use of purgatives, or from the commencement of inflammation of some part of the intestines; from disease of the liver; from a want of contractile power in the coats of the rectum; from some mechanical obstruction preventing the progressive motion of the contents of the tube; or, lastly, from organic or inflammatory disease of the brain or spinal cord, or their membranes.

SECTION 3. SYMPTOMS BELONGING TO THE FUNCTION OF RESPIRATION.

These symptoms are of great importance, not only in reference to diseases of the organs of respiration, but also in respect to many other maladies to which the human frame is liable: especially perhaps in regard to the diagnosis of diseases of the heart and large vessels, diseases of the brain, abdominal viscera, and certain febrile and constitutional disorders. I shall first make a few remarks upon the function of respiration and then speak of the symptoms to be derived from dyspnœa, orthopnœa, the odor of the breath, the temperature of the expired air, cough, hiccough, expectoration, stertor, yawning and sighing, and, lastly, sneezing.

The various and highly important physical signs of pulmonary disease made evident by auscultation, percussion, mensuration, palpation &c., will be discussed in another part of this work, when treating of the diagnosis of the special diseases of the lungs.

The Respiration.—In judging of the signs derived from the character of the respiration, it must be remembered that this function is remarkably influenced or modified not only by disease, but also by age, sex, temperament, the sleeping and waking states, mental emotions, the position of the body, and the temperature and pressure of the air. Every respiration consists of an inspiration and an expiration, each occupying nearly equal spaces of time, the duration of inspiration slightly preponderating over that of expiration. In the healthy adult the act of respiration is performed almost automatically, about eighteen times in a minute, or once for every four beats of the heart; in women and children the respirations are quicker and louder, averaging in the latter about twenty-five in a minute. The number of respirations is also less during the sleeping than the waking state; in the recumbent position than in the sitting; and in the sitting, than in the erect posture. When, however, a part of the lungs is rendered unfitted for performing its office, or when too great a quantity of blood is sent to the lungs for decarbonization, the frequency of the respirations becomes increased, this frequency varying until—in very unfavorable cases—it even reaches sixty in the minute. When, from any cause, a pause of three minutes takes place in the play of the lungs, death is said to result.

Dyspnœa.—This term literally signifies difficult breathing, a condition which arises when, from any cause—either derangement of function or change of structure—the proportion between the quantity of atmospheric air that reaches the lungs, and the quantity of blood that is sent to them from the right side of the heart to be arterialized, is altered. When the dyspnœa is permanent, the prognosis will be very unfavorable; the greater its degree also the more there is to fear, although it is not always directly proportioned to the organic change.

The conditions leading to this alteration are numerous and diversified. Thus the blood itself may be in such an unhealthy condition that its circulation becomes impeded, as in malignant cholera; or it may become congested in the pulmonary capillaries, and so retard the circulation, and, at the same time, hinder the entrance of air into the pulmonary cells;

or it may be sent too quickly to the lungs, as in fever and inflammation. So also the fault may be in the air, which may be too much rarefied, or may have poisonous gases mingled with it, and be thus rendered unfit for aerating the blood. Different diseases of the lungs, giving rise to consolidation, or compression, or destruction of the pulmonary tissue, or loading the bronchial tubes and air-cells with liquid, will shut out the air. Pneumonia, bronchitis, pulmonary hemorrhage, phthisis, pleuritic effusion, the presence of air in the pleura, pericarditis with effusion, and aneurismal or other tumors within or pressing upon the thorax, will operate in excluding the air from portions of the lungs; and consequently the respirations will be augmented, in order that the sound pulmonary tissue may counterbalance, by increased work, the loss of function in the diseased part. Constriction of the air-passages by spasm—as in asthma, or by the presence of tumors; obstruction of the trachea by false membranes—as in croup; or great swelling of the tonsils; or inflammation of the glottis, will all impede the entrance of air to the lungs, and give rise to dyspnœa. The pulmonary branches of the par vagum constitute the principal and constant *excitor*, as the nerves that supply the muscles of respiration—the phrenic, intercostal, spinal accessory, long thoracic, and the branches of the spinal nerves supplying the abdominal muscles—are the *motor* links of the nervous chain by which the automatic respiratory movements are governed. Hence disease in these nerves, or in the parts of the nervous system from which they arise, produces disorder in the function they govern, of the most serious kind. The ultimate branches of the par vagum being distributed over the stomach, accounts for the connection which so frequently exist between dyspnœa, dyspepsia, and functional derangement of the heart. And, lastly, disease of the muscles of respiration themselves, gives rise to dyspnœa; the healthy muscles being stimulated to excessive action, in order to compensate for the loss of power in those affected.

Healthy inspiration is performed with ease and freedom, and is effected by a nearly equal elevation of the ribs, a turning of their bodies outwards—by which the horizontal and antero-posterior diameters of the thoracic cavity are enlarged, and a depression of the diaphragm; in women the respiration is more costal and less diaphragmatic than in men. Ordinary expiration is the natural return of the thoracic cavity to its size during rest, owing to the weight and elasticity of its walls; the diaphragm becomes relaxed, and ascends into the chest;

the abdominal muscles, which had been protruded, return to their natural position; and the costal cartilages, which had been rendered tense by the act of inspiration, bring their elastic properties into play, and, aided by the resiliency of the lung, combine to produce a general diminution of the thoracic cavity. In certain forms of dyspnœa, however, the respiratory exertion is more perceptible in one part than in another, and authors therefore speak of abdominal, thoracic, and cervical respiration. In *abdominal* respiration the abdomen rises and falls considerably, the diaphragm being chiefly exerted, while the ribs remain motionless. It occurs when the thoracic movements are rendered painful by pleurisy, or fracture of the ribs; and also in apoplexy, and in cases of extreme prostration when an insufficient supply of blood is sent to the brain. The *thoracic* respiration, with suppression of the abdominal movements, indicates obstruction to the free action of the diaphragm, such as may arise from enlargement of the liver or spleen, from an over-distended stomach, ascites, ovarian dropsy, a very enlarged uterus, &c.; it also occurs in peritonitis, when each movement of the abdominal parietes increases the general distress and the local pain. And, lastly, the *cervical* respiration—when each inspiration is effected with considerable exertion of the superior ribs, the sterno-mastoids, and other muscles of the neck—indicates that higher grade of difficult breathing so often seen in advanced stages of pulmonary or cardiac affections, and in obstructive disease of the larynx.

Orthopnœa.—Orthopnœa is said to exist when the derangement of the respiratory function is so great that the sufferer cannot lie down, but can only respire in the erect posture; in which position greater freedom is allowed for the expansion of the chest, and all pressure upon the diaphragm by the abdominal viscera is removed. This variety of dyspnœa is often witnessed in asthma, in certain stages of hydrothorax, in general dropsy, and in diseases of the abdominal viscera. In asthma, the paroxysms of difficult breathing are frequently so severe, that a person unacquainted with the nature of the disease would suppose the sufferer to be at the point of death; yet the attacks are seldom attended with immediate danger, and often rapidly pass away.

The Odor of the Breath is subject to great variation, being sweet and agreeable in perfect health; foul and unpleasant in disorder of the digestive organs, in scurvy, malignant sore throat, &c.; and generally peculiarly faint at the time of the flow of the catamenia. During the progress of the

exanthematous, typhoid, and pestilential fevers, it is disagreeable and infectious; but in no disease is it so bad—so overpoweringly offensive—as in gangrene of the lung, which may be almost diagnosed from the putrid odor of the breath alone.

The Temperature of the Expired Air.—In fevers, in sthenic inflammations of the bronchial tubes, lungs, or pleura, and in most inflammatory disorders during their early stages, the temperature of the expired air will be found raised more or less above the natural standard; while, on the contrary, it is lowered in all malignant and depressing affections, as in the last stages of fever, in suffocative catarrh, and the collapse of cholera.

Cough.—A common symptom in diseases of the chest is cough, which may be defined as an abrupt, loud and violent expiration, accompanied by a contraction of the glottis, trachea, and larger bronchial tubes; having for its object the expulsion of a foreign body, the presence of which is irritating the air-passages. It may therefore often be regarded as conservative—as an effort of nature to expel something from the air-passages or lungs which should not be there. This is not always the case, however; since if, in any way, any portion of the vagus nerve above the part where the pulmonary branches are given off be irritated, cough will result.

There is a great diversity in the character of the cough, which has received names corresponding with its peculiarities. Thus, we have the *dry cough*, so often resulting from exposure to cold, the inhalation of acrid or acid fumes and gases, the accidental passage of foreign substances into the trachea, the irritation of the glottis by an enlarged uvula, and so on. Many hysterical, weak, nervous women, also, suffer frequently from a *dry barking cough*—more painful to the bystanders than the individual who utters it—without any appreciable cause. *A dry hoarse cough* is often one of the earliest symptoms of severe affections of the larynx, trachea, or lungs; of organic disease of the heart, or of the large thoracic blood-vessels; and sometimes of an irritated condition of the mucous surface of the stomach and œsophagus, of inflammation of the liver, and of obstruction of the gall-duct; in the latter case, however, the cough is generally *spasmodic*, recurring from time to time in severe paroxysms. The *moist* or *humid cough* may follow the preceding, or may occur primarily from any of the causes of common catarrh. In old people it is a frequent sign of chronic bronchitis; and many delicate persons suffer yearly from *winter cough*, with excessive secretion of mucus, and relaxation of the vessels of the air-passages.

Accordingly as each paroxysm consists of one cough, or of a series of them, so a different condition is denoted. The occurrence of a single sharp cough is common in pleurisy, in the first stage of pneumonia, and in the early or crude stage of tubercular deposit. On the contrary, the cough recurs in paroxysms of some duration, in croup, hooping-cough, asthma, bronchitis, emphysema of the lungs, phthisis with tubercular cavities, diseases of the heart, and in cerebral irritation. In many of these cases, moreover, the fits of coughing come on in unequal paroxysms; severe exacerbations being especially frequent towards the morning, and less common as the evening approaches.

Hiccough.—Singultus, or hiccough, may be defined as an uneasy sensation at the præcordia, with a spasmodic, rapid, but momentary contraction of the diaphragm, and other respiratory muscles, occurring at short intervals and causing a loud, frequent, and slightly painful inspiration. It is frequently produced in infants, young children, and aged people, by any slight irritation of the stomach or duodenum; mental emotions, as laughter or crying, as also uterine irritation, often give rise to it in hysterical or pregnant women; inflammation of the liver, or diaphragm, or pancreas, or cardiac orifice of the stomach will cause it; tumors pressing upon the eighth pair of nerves may originate it; and, lastly, it is common towards the fatal termination of many acute diseases, fevers, and hemorrhages, when it forms an important—because very unfavorable—symptom.

Expectoration.—Expectoration is the act of discharging, by coughing, hawking, or otherwise, the secretions or fluids of the fauces and air-passages. The sputa are evacuated or expectorated with ease or difficulty, according to the nature and stage of the disease, the age and strength of the patient, and the viscidity or fluidity of the expectoration. An easy expectoration is usually regarded as favorable in all diseases of the respiratory organs. In children, the sputa are generally swallowed.

A difficult expectoration of viscid sputa, at the commencement of any pulmonary affection, is of no unfavorable import; but it becomes so, in an advanced stage of disease, whether the cause be want of secretion, or too little power to discharge it when formed. In gangrene of the lung, in the chronic bronchitis of aged people, and in phthisis as death approaches, the morbid secretion accumulates, is expectorated with greater difficulty, and the weakness increasing, the functions of the lungs become impeded, and ultimately arrested.

For the chemical examination of the sputa, and the signs to be derived from their general appearance, &c., see Chapter XI, Section 2.

Stertor.—Stertor, or stertorous breathing, is merely that form of respiration in which each inspiration is attended with deep snoring. It occurs during the insensibility following an attack of apoplexy; in compression of the brain from fracture of the skull, and in many other cerebral diseases; and in cases of coma, a condition in which the functions of organic life—and especially the circulation—continue in full force, while the functions of animal life—with the exception of the mixed function of respiration—are suspended.

Yawning and Sighing.—These are nearly related phenomena, consisting of prolonged and deep inspirations, with short and strong expirations; and indicating fatigue from nervous exhaustion and weariness, or the depression arising from ungratified mental desires. Yawning is generally a sign of mental vacuity and fatigue; sighing, of mental depression and sorrow. Yawning is often a troublesome and, generally, an unfavorable symptom after an attack of hemiplegia; it comes on when the first effects of the shock are subsiding, and is troublesome in proportion to the severity of the shock.

Sneezing.—Sneezing—sternutatio—is produced by a deep inspiration, followed by a violent, loud, convulsive expiration, whereby the air is driven rapidly through the nasal fossæ, carrying with it the mucus and foreign bodies adhering to the Schneiderian membrane. Anything which stimulates the nasal mucous membrane will cause sneezing. It is commonly occasioned by common catarrh, or by disease of the respiratory organs; it is sometimes a sympathetic phenomenon in hysteria, and in irritation of the intestinal canal from worms, &c. Accompanied by vertigo and tinnitus aurium, it sometimes precedes or ushers in a fit of apoplexy, or an attack of paralysis.

SECTION 4. SYMPTOMS BELONGING TO THE FUNCTION OF CIRCULATION.

The morbid affections of the function of the circulation are observed chiefly in palpitations of the heart and large vessels, in the pulse, in the condition of the capillaries, in certain symptoms derived from the venous system, and in the state of the blood.

Palpitations of the Heart and Large Vessels.—In a state of health we are not generally sensible of the beating of

our hearts; but when the pulsations become much increased in force or frequency, the distressing sensation known as palpitation is experienced. Increased action of the heart results from many conditions, both from slight effects—as violent exertion and mental excitement, as well as from severe causes, especially such as give rise in any way to obstruction of the circulation. In enlargement of the heart with thickening of its parietes, there is palpitation, and the pulsations of the carotids and other large arteries are violent, and painfully felt. So, in atrophy of the heart with thinning of its walls, this organ beats more feebly than in hypertrophy, but the pulsations spread over a greater extent of surface; the beating of the large vessels is not felt. There is also more or less palpitation when the circulation becomes deranged from disease of the lungs; as in pneumonia during the stage of hepatization, in severe bronchitis, in hydrothorax, pleurisy, pneumothorax, asthma, laryngitis, &c.

Palpitation is a common symptom in hysteria and other nervous disorders: and a more common symptom still, is a feeling of "fluttering" at the heart, and in the region of the stomach, with throbbing of the temporal arteries. A sensation of pulsation in the epigastric region is often connected with imperfect digestion in irritable constitutions, and gives rise to great distress. A similar pulsation is experienced in aneurism of the aorta, or when any tumor lies over this vessel. But the most extraordinary degree of palpitation and of morbid pulsation in the large arteries is observed in instances of exhaustion from the loss of blood. In a case of flooding after parturition, which occurred in my own practice, the patient complained much of her sufferings in this respect, and stated that she could feel every artery in her body beat, until her condition was relieved by the free employment of stimuli.

The Pulse.—In examining the pulse, there are a few brief practical rules which it behooves the physician to bear in mind. Thus—

1. The pulse should be felt by applying three or four fingers to the radial artery, as it lies in front of the wrist. After ascertaining the frequency and equality of the pulse, the fingers should alternately press upon the artery, and relax the pressure, so as to appreciate the degree of resistance. The pressure should be sufficient to allow of the beats of the artery being distinctly felt, yet not so forcible as to obliterate the pulse, however weak it may be. The artery at the wrist affords, in the majority of cases, the most eligible part for ascertaining the state of the pulse; still it occasionally becomes necessary

to examine the artery near the seat of disease, as for example, the temporal artery in cerebral affections.

2. In feeling the pulse of timid, nervous, or excitable persons, great caution and calmness is necessary, in order not to excite the heart to increased frequency of action. The patient should be engaged in conversation, so as to divert his attention, and the practitioner should wait until the first agitation occasioned by his visit has subsided. The indications afforded by the pulse cannot be relied upon immediately after bodily exercise, or mental emotion of any kind.

3. The patient should be in the sitting or horizontal position, unless it be desirable to ascertain especially the effect of standing. Both wrists should be examined, since the vessel on one side is sometimes larger than that on the other; moreover, the artery sometimes deviates from its natural course, so that the patient may *appear* pulseless. Care must be taken that no pressure is exerted upon the artery in any part of its course by ligatures, tight sleeves, tumors, &c.

4. The pulse should, in acute cases, be felt more than once at each visit; its diversities will be thus positively ascertained, and the conclusions formed by the practitioner from the first examination confirmed or corrected.

The pulse is produced by the blood sent into the aorta by each systole or contraction of the left ventricle of the heart; consequently, its nature will depend on the condition of the arteries, of the blood, and of the heart. In each pulsation the artery is slightly expanded, and perhaps laterally displaced; it then returns to its original size and position, after which there is an interval of rest. The frequency of the pulsations, and the regularity or irregularity of their succession, must depend upon the heart. The pulse at the wrist corresponds to the systole of the ventricles, making allowance for the slight interval that must elapse before the wave of blood reaches so distant a part.

In the healthy adult male, the pulse may be described as regular, equal, compressible, moderately full, and swelling slowly under the finger; in the healthy female, and in children of both sexes, it is rather smaller and quicker in the beat. In individuals of a sanguine temperament, the pulse may be described generally as full, hard, and quick; in those of a nervous temperament, it is softer and slower. In old age, the pulse assumes a hardness which it would not otherwise possess, owing to the increased firmness of the arteries.

The pulse has its maximum *frequency* in early infancy, and its minimum in robust old age. According to Quetelet,[1] it

[1] Sur l'Homme, vol. ii, p. 86.

may be estimated to range in infancy from a maximum of 165 to a minimum of 104, the mean being 135. This agrees with the conclusions of most authorities in this country, who regard it as being—at this period of life—on the average 140.

The average frequency of the pulse in 27 males and 34 females, each sex being of the mean age of 71 years, was found by MM. Leuret and Mitivié to be, in round numbers, 76.[1] Dr. Pennock's observations on 170 males and 203 females, of the mean age of about 67 years, give as the average 75 beats in a minute.[2] A progressive decline from infancy to old age, with a slight decreasc during the period of decrepitude, may be statcd as the true law of the pulse. This is well shown in the following table, by Dr. Guy,[3] which presents the number of the pulse at eaeh quinquennial period throughout the whole of life. The averages for the first eight periods, are founded each on fifty observations, of whieh half werc madc on males and half on females. The averagc for the period from seventy-six to eighty is deduced from the same number of facts similarly divided; while, for most of the other periods, the averages are derived from forty observations—twenty on males and twenty on females.

Age.	Max.	Min.	Mean.	Range.
2 to 5	128	80	105	48
5 — 10	124	72	93	52
10 — 15	120	68	88	52
15 — 20	108	56	77	52
20 — 25	124	56	78	68
25 — 30	100	53	74	47
30 — 35	94	58	73	36
35 — 40	100	56	73	44
40 — 45	104	50	75	54
45 — 50	100	49	71	51
50 — 55	88	55	74	33
55 — 60	108	48	74	60
60 — 65	100	54	72	46
65 — 70	96	52	75	44
70 — 75	104	54	74	50
75 — 80	94	50	72	44
80, and upwards.	98	63	79	35

[1] De la Fréquence des Pouls, chez les Aliénés.

[2] Note on the frequency of the Pulse and Respiration of the Aged. "American Journal of Medical Science," July, 1847.

[3] Cyclopædia of Anatomy and Physiology: Article, *Pulse*.

The result of all these observations, and a careful examination of the foregoing table, shows that the pulse may be stated, in round numbers, as being—

At birth,	140.
During infancy,	120 to 130.
In childhood,	100.
Youth,	90.
Adult male,	70 — 75.
Adult female,	75 — 80
Old age,	70.
Decrepitude,	75 — 80.

The pulse is modified by several circumstances besides disease. Thus posture has a very considerable influence on its rhythm or frequency, even in healthy persons; this influence being still more marked in disease, more in males than in females, and in adult age than in youth. The pulse is more frequent standing than sitting, and sitting than lying; on the contrary, it is stronger lying than standing, so that its minimum of frequency and its maximum of strength are attained together. According to Dr. Guy[1] the mean numbers of the pulse, in the healthy adult male, are as follows; Standing, 79; sitting, 70; lying, 67; while, in the healthy adult female, the numbers run: Standing, 89; sitting, 82; lying, 80. Dr. Graves lays down as an established law, that, in a debilitated person, when a sudden change of position—as from the erect to the horizontal—makes little or no difference in the frequency of the pulse, we may conclude that the heart or at least its left ventricle, is increased in size and strength.[2]

Sex influences the frequency of the pulse to some degree. The female pulse differs but slightly from that of the male during the earlier years of life; but after about eight years of age, the mean pulse of the female exceeds that of the male by from six to fourteen beats, the average excess being about nine beats in a minute. The pulse is usually also more frequent and more developed during pregnancy, especially in excitable women.

Muscular exertion temporarily increases the frequency of the pulse more than any other cause. This is especially the case in the early part of the day, the pulse, moreover, being always more frequent and more excitable in the morning than in the evening; the diminished frequency of the pulse towards the after part of the day probably depends on the exhaustion of

[1] Op. cit. p. 189.

[2] Lectures on Clinical Medicine. Second edition, vol. i. p. 50.

the strength. The pulse falls during sleep, considerably in children and in irritable nervous persons, but slightly in healthy adults. The general effect of food is to excite the pulse; warm drinks, alcoholic liquors, and tobacco especially do so. So also heat, inflammatory action, fever, extreme debility, sleeplessness, the first stage of plethora, loss of blood, and the exciting passions and emotions, increase the frequency of the pulse, from seventy or eighty beats in a minute, up to 100, 120, or even to 200; while cold, continued rest, sleep, slight fatigue, want of food, digitalis, increased atmospheric pressure, and the depressing passions of the mind, diminish its frequency to sixty, fifty-five, or even forty beats per minute.

Quickness of pulse differs from frequency, the latter having reference to the succession of the pulsations, the former to each beat separately. A frequent pulse is one in which the number of pulsations is greater than usual in a given time; a quick pulse, one in which each beat occupies a less period of time than naturally, although the whole number of beats may not be materially increased. A quick pulse is generally a sign of nervous disorder, indicating irritation with debility; a frequent pulse is indicative of arterial excitement—frequently of inflammation, or of great depression, as just shown.

The *jerking* pulse is characterized by a quick, rather forcible beat, followed by a sudden, abrupt cessation, as if the direction of the current had suddenly changed; it was pointed out by Dr. Hope as indicative of deficiency of the aortic valves, and consequent regurgitation into the ventricle. Somewhat allied to this is the *thrilling* pulse of aneurism, cardiac disease, or anæmia.

Regularity of the pulse is generally a favorable sign in disease, although cases are recorded in which the pulse being uniformly irregular, or even distinctly intermittent in health, has become regular during the progress of disease, and resumed its irregularity on recovery. The *intermittent* pulse —that in which a pulsation is occasionally omitted—is often due to some obstruction to the circulation in the heart or lungs, to aortic aneurism, or to some cerebral disturbance, particularly inflammation and softening of the brain, apoplexy, &c.; slighter causes, however, occasionally produce it, especially perhaps dyspepsia with flatulence, when occurring in the debilitated or aged. The *irregular* pulse is a higher degree of the intermitting, the pulsations being unequal, and continuing an indefinite time; disturbances of the circula-

tion, of the respiration, or of the functions of the brain, give rise to it; it is not unfrequently met with during the puerperal state, especially at the accession of puerperal fever.

The *volume* of the pulse may be greater than usual, when it is said to be *full*, as in general plethora, and in the early stages of acute diseases; or less than usual, when it is known as *small* or *contracted*—being sometimes so small that it is said to be *thread-like*—as in anæmia, after severe hemorrhage, and in all cases of great prostration. When the pulse resists compression it is termed *hard, firm, or resistent;* when very hard and at the same time small, *wiry; softness* of the pulse is almost synonymous with compressibility, and generally indicates defective tone and loss of vital power.

In fever, a dicrotous pulse—that is to say, a pulse which beats twice as fast as in health—which is at the same time hard, is a very unfavorable symptom, especially if it continue more than twenty-four hours; if, however, it is succeeded by epistaxis, and then disappears, it is more favorable. When, in fever, a hard dicrotous pulse lasts for many days, without any tendency to hemorrhage, the case—in nine out of ten—ends fatally. In hæmoptysis, long-continued epistaxis, and internal inflammations, a very hard dicrotous pulse sometimes occurs, which resists all treatment, and portends a fatal issue; no matter how much the other symptoms may improve, so long as the pulse retains this character, the patient is in imminent danger.[1]

Lastly, if the pulse at both wrists be not isochronous or equal—if the beats do not occur at the same time—we must suspect disease of one or the other radial arteries, or that pressure is made upon some part of the arterial tract between the heart and wrist by a tumor, aneurism, &c.

Condition of the Capillaries.—The state of the capillary circulation on various parts of the surface, often furnishes indications of some importance as respects vascular action and vital power, especially in the exanthematous fevers and in cachectic diseases. By pressing the finger upon the skin and noticing the rapidity with which the blood returns into the whitened spot, we ascertain the rapidity of the circulation through the capillaries; when the blood returns quickly into these minute vessels, the circulation is active and healthy; when it returns immediately, and the skin is of a vivid color, there is congestion; while if the redness at any one part remains unaffected by pressure, we may be sure that there is extravasation of blood. As old age advances the capillaries

[1] Graves, op. cit. p. 50.

become impaired in vital tone, and the skin consequently is rendered colder and paler than in adult life. The same occurs frequently from exhausting diseases, denoting a failure in the general strength of the system which demands our greatest attention.

Venous Symptoms.—The veins furnish signs of disease by their dilatation and over-distension, as occurs in the veins of the temples, face, and neck, in congestion of the brain; by the slowness or rapidity of their distension when pressure is applied in their course to the heart, showing the excess or deficiency of blood in the system; and by their occasional pulsations. The occurrence of a venous pulse results either from a continuation of the heart's impulse through the capillaries, when the circulation is much excited; or from an artery lying under or near a vein; or it may be due—when felt in the jugulars—to a retrograde current, produced by inordinate contraction of the right ventricle and regurgitation of blood, owing to hypertrophy of the right ventricle with dilatation of the right auriculo-ventricular orifice and imperfect closure of the tricuspid valve.

State of the Blood.—In man, as well as in the most perfect animals, the blood during life never rests, but is constantly in active motion, running in a double circle, from the first respiration until death. Having become impure in the course of its circulation, it is purified in the lungs; the pure blood is then sent all over the body, when a part of it becomes solid, a part is removed by the secreting organs, and the rest becoming venous is again returned to the lungs and heart.

The supply of blood being adapted to the capacity of the vascular system, any deviation from the normal quantity will affect the whole body. *Excessive fulness of blood* will give rise, in proportion to the fulness, to a full, broad, and tense pulse; to congestion of the sinuses and other vessels of the cerebro-spinal system; to congestion of the lungs, liver, and other important viscera, as well as to spontaneous hemorrhages. *When the blood is deficient in quantity*, the pulse will be found soft, weak, and very compressible, the impulse of each wave of fluid through the artery being quick and sudden: the vital powers will be found depressed to a low state, the organic nervous energy weakened, and the different functions will be feebly, if not imperfectly performed.

The morbid effects of the loss of blood may be divided into the *immediate* and the *remote*. The *immediate* effects are syncope or fainting, from its slightest to its fatal form; convulsions, most apt to occur in children, and in cases of slow

and excessive draining of blood; delirium, as is frequently seen in flooding after parturition; coma, the comatose condition being often as perfect as after a fit of apoplexy; and, lastly, sudden dissolution may take place from copious bloodletting. The *remote* effects are exhaustion with excessive reaction; exhaustion with defective reaction; exhaustion with sinking of all the vital powers; mania; and coma, from which it is impossible to recover the patient.

Dr. Marshall Hall has suggested, that, in cases in which it is doubtful whether the pain or other local affection be the effect of inflammation or of irritation, the doubt should be solved by placing the patient upright, and bleeding to incipient syncope; in inflammation much blood flows, in irritation very little. As this has been considered a very important means of diagnosis, it is necessary for the reader to be acquainted with it, though I doubt very much the propriety or even the necessity of resorting to such a test. Happily, owing to our increased knowledge of disease, the use of the microscope, and the aid of chemistry, we are able, in the present day, to ascertain all that it is desirable to know of the nature of the blood from the examination of a very small quantity, such as a few drachms, or even less.

If the quantity of blood in the system influences disease, it will readily be imagined that the *quality* of this fluid must do so to a very important extent; and such is the case. There is, however, no standard analysis of blood to which all other analyses may be positively referred, since each moment the composition of this fluid, as a whole, is changing. Thus, the water is always varying in amount; the nitrogenized and unnitrogenized substances are always changing in quantity; even the salts, even the alkalescence of the blood is in a perpetual state of variation, being hardly the same at any two moments of the day. If this is the case in health, how much more so will it be the case in disease. That the constituents of the blood undergo various and important alterations in their amount, in different constitutional affections, will be readily seen by the table on p. 117, which presents roughly the most striking variations.[1]

The facts which have been satisfactorily made out concerning the morbid conditions of the human blood are not very numerous, and much remains to be accomplished. Amongst the chief diseases, however, in which a pathognomonic condition of this fluid has been discovered, I may mention inflammatory affections, characterized by the constant increase in the amount

[1] See Lecture on Animal Chemistry, by Dr. Bence Jones, Lancet, 26th January, 1850.

of the fibrin; anæmia, by a decrease in the red corpuscles; certain renal affections, by the diminution of the solids of the serum, and frequently by an accumulation of urea; gout, by the existence of uric acid, as has been so ably demonstrated by Dr. Garrod; diabetes, by the presence of sugar; jaundice, by the existence of the coloring principle of the bile; insanity —more than two-thirds of the cases of madness being the result of some alteration in the blood—(Romberg); and cholera, in which there is a diminution of the water—causing the blood to become thicker, tar-like, and less coagulable, an increase in the solid portions of the serum—especially the albumen, and a retention of urea.

Constituents of the Blood.	In Health.	Variations in Disease.	Rheumatism.	Fever.	Anæmia.	Cerebral Congestion.	Bright's Disease.
Fibrin, ...	3	10½ to 1	10	·9	3·5	2·7	3·2
Globules, . . .	127	185 " 21	101	93·1	38·5	152·3	82·0
Solids of Serum,	80	114 " 57	90	86·0	89·0	105·0	64·8
Water	800	915 " 725	799	820·0	869·0	740·0	850·0
	1000		1000	1000·	1000·	1000	1000·

A few years since Dr. Garrod discovered a substance in the blood which crystallizes in microscopic, octahedral crystals, and which he regards as oxalate of lime.[1] And, more recently, a very curious disease has been described by Virchow and Dr. Hughes Bennett, named by the latter leucocythemia, from λευκος, white, κυτος, a cell, and αιμα, the blood; literally, white-cell blood. On examining the blood microscopically, under a magnifying power of 250 diameters, in a case of leucocythemia, the yellow and colorless corpuscles are at first seen rolling together, the excess in the number of the latter being at once recognizable, and becoming more evident as the colored bodies became aggregated together in rolls, leaving clear spaces between them filled with the colorless globules. A drop of blood taken from a prick in the finger is sufficient for examination. The chief symptoms presented by a person suffering from leucocythemia are great pallor, with gradually increasing emaciation and debility. It will probably be found, as we learn more of this affection, to be associated with enlargement of some or all of the following glands—the liver, spleen, thyroid, thymus, supra-renal capsules, and lymphatics.

[1] Medico-Chirurgical Transactions, 1849.

For an account of the chemical and microscopical examination of the blood, see Chapter XI, Section 1.

SECTION 5. SYMPTOMS CONNECTED WITH THE URINARY AND SEXUAL ORGANS.

The *symptoms furnished by the urinary organs* divide themselves into two classes, *i. e.*, into those to be gathered from a chemical and microscopical examination of the urine, for the purpose of discovering those morbid conditions of this secretion which may be produced by local disease of the renal organs, by various constitutional conditions, and by disease of the brain or spinal cord; and those which depend on the modes of voiding this secretion. The former will be fully considered in Chapter XI, Section 4; the latter will now be treated of

The Excretion of the Urine may be difficult, or painful, or changed, or arrested. With respect to the difficulty of voiding the urine, three grades have been distinguished: dysuria—δυς, with difficulty, and ουρον, the urine—in which the urine is voided with trouble or effort, pain, and a sensation of heat in some part of the urethra; strangury—στραγγειν, to squeeze, and ουρον—in which the difficulty is extreme, the urine issuing drop by drop, and being accompanied by heat, pain, and tenesmus at the neck of the bladder; and ischuria—ισχω, I arrest, and ουρον—in which no urine at all can be passed.

The first two species—*dysuria* and *strangury*—should always attract attention, since they cause great suffering, and lead to conditions by no means devoid of risk, more particularly in aged persons. They may proceed—either from disease of the urinary organs or passages, as, stricture, or inflammation of the urethra; hypertrophy of the middle lobe of the prostate; spasm, catarrh, inflammation, or ulceration of the bladder; and fungous or polypoid growth;—from morbid states of the urine, as, the admixture of pus, blood, mucus, gravel, &c.; or from this secretion being too irritating; or from the existence of one or more calculi in the bladder or urinary passages:—or from disease of the adjoining viscera, as in instances of dysentery, disease of the liver or spleen, tumors of the abdomen, and uterine or ovarian affections.

Ischuria—in which no urine at all can be passed—is divided into that of suppression, and that of retention. *Suppression of urine*—sometimes called ischuria renalis, in which no urine is secreted—is a most dangerous symptom, since the injurious, effete, and poisonous materials which should be excreted by

the functions of the kidneys, accumulate in and vitiate the blood, and in a few days poison the sufferer. It may be caused by inflammation, suppuration, or other structural changes in the kidneys themselves; or by congestions occurring in the course of the exanthematous or other fevers; or by disease of the blood, as is seen in malignant cholera and other pestilences; or by organic or other affections of the brain, spinal cord, or their membranes. *Retention of urine*—ischuria vesicalis—may depend upon two sets of causes; either upon some obstruction to the flow of the secretion, as a calculus, tumor, inflammation, &c., situated either at the outlet of the pelvis of one or both kidneys, or in the course of the ureter, in which case none of the urine will reach the bladder, but accumulate behind the seat of obstruction; or, the urine entering the bladder, there may be inability to discharge it, from—first, paralysis of the coats of this viscus consequent upon disease of the brain or spinal cord, or upon congestion of the nervous centres and paralysis of the bladder—as occurs in the course of low fevers, or from paralysis of the bladder from over-distension; or, second, the bladder being healthy, there may be some obstruction in the neck of this organ or in the passage of the urethra, the obstructing cause consisting either of an impacted calculus, or of a spasmodic or structural stricture. It must also be borne in mind that nervous anæmic women, and those who practise masturbation, often suffer temporarily from hysterical retention of urine, sometimes necessitating the use of the catheter for many days: recovery takes place as the general health improves, and the bad habits are discontinued.

Incontinence of Urine.—Inability to retain the urine—incontinentia urinæ, vel enuresis—presents different grades, varying from very frequent and irresistible calls to micturate to a constant dribbling. A frequent desire to pass water is experienced in most inflammatory affections of the urinary organs, especially those affecting the bladder; in disease of the neck of the bladder, as well as in cases in which foreign bodies are present in this viscus—as calculi, clots of blood, fungoid growths, &c.; and in many nervous affections, hysterical women especially often suffering from it. The most frequent cause of a constant dribbling of the urine is paralysis of the neck of the bladder through general debility, as in aged persons; or paralysis of the lower half of the body—paraplegia; or overdistention of the bladder, producing complete loss of contractile power in the coats of this organ, so that the urine accumulating literally overflows. This latter

condition is readily recognized by the dull sound elicited on practising percussion immediately over the pubes, by the pain complained of in the same situation, and by the sense of fulness communicated to the touch.

Symptoms from the Sexual Organs.—The symptoms derived from the sexual organs in the male have not received much attention. In health the penis and testes are well developed, the scrotum firm and contracted, and the testes drawn upwards by the contraction of the cremaster muscles. Extraordinary size of the penis is a sign of sexual excess, and in boys of onanism; irritation at the end of this organ, with continued erections—priapism—is often symptomatic of the presence of a calculus in the bladder. In low fevers, in diabetes, at the commencement of all acute disorders, and in all cases of vital depression or of nervous exhaustion, the dartos is no longer corrugated, and the scrotum therefore hangs loose and flabby; the cremasters do not contract, and the testicles, consequently, hang low down; and there is a want of the power of erection, with loss or imperfection of the sexual desires. It is perhaps remarkable that in chronic diseases of the lungs and heart, and especially in pulmonary phthisis, the sexual powers are seldom much impaired.

The influence exerted on the mind and body of women by the wonderful nature of *the uterine system*, and the extraordinary functions performed by it, is very remarkable. The reciprocal relation existing between the uterine organs and the nervous and sanguineous systems and the organs of nutrition, is very much closer than that between the sexual system and the same organs in man. The regularity or irregularity of the menstrual flow, for example, affects the whole circle of mental and corporeal actions; the derangements of menstruation being in some instances causes, in other results, of almost the entire class of female disorders. Amenorrhœa, leucorrhœa, dysmenorrhœa, and menorrhagia are in general merely symptoms of many opposite constitutional states; and to look upon or treat them as local diseases is, as a rule, to commit a most pernicious error.

The amount of sympathetic irritation excited in the breasts, in the stomach and bowels, and in the nervous system by pregnancy, is always very considerable. M. Nauche states that pregnancy in general increases acute diseases, especially those involving the uterus; chronic diseases are rendered slower in their progress and sometimes cured, and a temporary benefit is experienced in phthisis.[1] Dr. Montgomery believes that

[1] Mal des Femmes, Part ii, p. 690.

pregnancy acts in a great degree as a protection against the reception of disease, on the well-known common principle that the continuance of any one very active operation in the system renders it less liable to be invaded or acted upon by another.[1]

SECTION 6. SIGNS DERIVED FROM THE NERVOUS SYSTEM.

The signs derived from the nervous system, which it is necessary here to consider, are not very numerous. They consist chiefly of those derived from derangements of general sensation, as pain, &c., from paralysis, from spasm, from delirium, and from coma.

Pain.—General sensation may be deranged in two ways: it may be either morbidly keen or morbidly obtuse. When morbidly keen, it constitutes various kinds of uneasiness, which may all be classed together under the head of pain. Pain has various sources. Irritation or excessive excitement of the nervous structures or functions will produce it; so will inflammation, depression and debility, cold; and in diseases generally, the sensibility of the nerves being exalted, pain will be caused by ordinary agents, which in health would excite no sensation. A definition of pain is unnecessary, since all have suffered from it at one time or another. It is a most important sensation, since it often indicates the seat and nature of disease. It differs exceedingly in degree, in its duration and mode of recurrence, and in its character. Thus in its different grades it is spoken of as *slight, moderate, severe, violent, excruciating, intense,* or *agonizing.* As regards its recurrence, it may be *fugitive* or *persistent, wandering* or *fixed, intermittent, remittent,* or *continued.* In character pain may be *dull,* or *obtuse,* or *heavy,* or *aching,* as it usually is in connection with congestions and chronic inflammations, or in acute inflammations of parenchymatous organs; or it may be *gnawing* or *lacerating,* as is the pain of rheumatism and gout, and of periostitis; or it may be of a *cutting, lancinating* character, as occurs in scirrhus, and in inflammations of the nerves; or it may be *griping* or *twisting* and *spasmodic,* as accompanies dysentery, ileus, gastralgia, enteralgia, and obstruction of the intestines. When pain is attended with a beating, throbbing sensation, consequent upon the heart's action, it is called *pulsating;* when with a feeling of tightness, *tensive;* when with heat, *burning.* From this it is apparent

[1] Signs of Pregnancy, p. 25.

that not only are different kinds of morbid action accompanied by different varieties of pain, but that the same kind of morbid action—inflammation, for example—produces different modifications of suffering, according as it affects different parts. Thus in inflammation of the serous and synovial membranes, the pain is often very severe, and sharp or acute; in the mucous membranes and parenchyma of the viscera, it is dull or heavy; while in the skin it is apt to be burning, tingling, &c. So again pain often takes place, not in the organ really affected, but in some distant part. How commonly does inflammation of the liver almost first show itself by the pain it produces in the right shoulder; stone in the bladder, by pain at the end of the urethra; chronic ovaritis, by pain down the leg of the affected side; inflammation of the hip-joint, by pain in the knee; and disease of the heart, by pain down the left arm.

If pain be experienced only in a part when it is touched—when pressure is made upon it, the part is said to be *tender*. A part may, however, be both painful and tender. *Increased* pain on pressure indicates vascular congestion, inflammation, or some organic change the result of inflammation. Pain is *diminished* by pressure in colic, in chronic rheumatism, and in pure neuralgia, unless there be inflammation of the nerve or its sheath.

In forming an opinion as to the nature and degree of pain in any particular case, we must not allow ourselves to be misled by the statements of the patient. Many people are so prone to exaggerate the nature of their sufferings, and to use strong expressions in order to impress the importance of their symptoms upon the practitioner, that, to avoid being misled, it is necessary to be guided more by the expression of the countenance and the general appearance, rather than by what is said. If a person, for instance, tells us in a calm tone of voice, and with a composed countenance, that he is suffering the most excruciating tortures, we shall be justified in estimating the severity of the pains to be greatly less than the terms "excruciating tortures" would imply.

Diminished Sensibility.—This may vary from slight numbness, or from local or partial loss of sensation, to total loss of sensibility—anæsthesia. The sensibility is diminished or lost in certain forms of cerebral disease—especially apoplexy, epilepsy, catalepsy, and ramollissement or softening of the brain; in certain varieties of low fever, as typhus and typhoid; and in that peculiar stupor—almost amounting to coma—which often succeeds certain forms of delirium. Pressure

upon the nerve of a limb will cause anæsthesia in the parts below the seat of pressure. It is very rarely found that the sensibility of a part is so completely lost as to be insensible to severe kinds of injury; in general, there is only a numbness of the skin. Paralysis of motion is often unattended by loss of sensibility; but when otherwise, it will generally be found that anæsthesia more commonly precedes loss of motion of the lower than of the upper extremities, and that in any instance it rarely follows paralysis of motion.

Paralysis.—The functions of the brain and nerves may be said to consist of sensation, thought, volition, and the power of originating motion. The faculties of sensation, of thought, and of the will belong to the brain, and probably to the cerebrum alone; motive power resides in the spinal cord. Disease of the brain or spinal cord involving the extremities of certain nerves there organized will necessarily be followed by effects in the structures to which such nerves are distributed, and of which indeed they form an integral and necessary part. A common result of such disease is paralysis or palsy, by which is meant a local or partial loss of sensibility, or of motion, or of both, in one or more parts of the body. All paralytic affections may be divided into two classes—the first including those in which both motion and sensibility are affected; the second, those in which the one or the other only is lost or diminished. The former is called *perfect*, the latter *imperfect* paralysis. Imperfect paralysis is divided into *acinesia*—paralysis of motion; and *anæsthesia*—paralysis of sensibility. Again, the paralysis may be *general* or *partial*, as it affects the whole body or only a portion of it. *General paralysis*, or complete loss of sensation and motion of the whole system, cannot take place without death immediately resulting. But this expression is usually applied to palsy affecting the four extremities, whether any of the other parts of the body are implicated or not. *Partial paralysis* is divided into *hemiplegia* when it is limited to the lateral half, and *paraplegia* when it is confined to the inferior half of the body. The term *local paralysis* is used when only a small portion of the body is affected, as the face, a limb, a foot, &c.

Paralysis of the eye, or loss of sensibility of the retina to the rays of light, is called amaurosis; paralysis of the superior branch of the third nerve supplying the levator palpebræ superioris muscle, causing the upper eyelid to fall over the eye, is termed *ptosis palpebræ;* insensibility to the impression of sounds (deafness), *cophosis;* insensibility to odors (loss of smell), *anosmia;* loss of taste, *agcustia.*

There are also certain forms of paralysis arising from the use of metallic poisons, as *mercurial palsy*, and *saturnine* or *lead palsy;* and lastly, there is a peculiar affection known as *paralysis agitans*.[1]

Spasm.—Under the term spasm, Sauvages arranged all involuntary muscular contractions, and divided them into two classes, *tonic* and *clonic*. This division is still generally adopted.

Tonic spasm—called by Cullen spastic rigidity—is characterized by a long-continued contraction of the affected muscles, alternating with relaxation, the relaxation taking place slowly and after some time, and being quickly followed again by contraction. A very familiar example of tonic spasm is the common cramp of the leg. So also is the principal symptom of trismus, tetanus, and catalepsy. In *clonic spasm*, the contractions of the affected muscles take place repeatedly, forcibly, and in quick succession; and the relaxation is, of course, as sudden and frequent. Illustrations of clonic spasm are found in convulsions, in the rapid convulsive movements of epilepsy, of hysteria, chorea, &c. Occasionally we see the two forms of spasmodic action occurring in the same individual at the same time, some muscles being convulsed or affected with clonic spasm, while others are affected with rigidity or tonic spasm. The *exciting causes* of spasm are chiefly influences affecting the nervous centres, the mind, the senses, the digestive viscera, and the urinary or sexual organs. The *immediate cause* was supposed to be irritation of the nerves supplying the affected muscles, either at their origins, or in some part of their course, or at their terminations; or else a sympathetic affection of these nerves propagated from distant but related parts. Within the last few years, however, the doctrine of Sprengel has been revived, who regarded spasm as the result of an alteration of the polarization of the terminations of the nerves in relation to the muscular fibres.

Delirium.—Delirium has been divided into the *acute* and the *chronic;* the former consisting of various morbid states of the brain, attended by mental disturbance and fever—the latter of mental alienation, unattended by fever or active bodily disorder. Chronic delirium, therefore, comprises those states of disordered mental manifestation known as insanity.[2] Acute delirium is more common in the severe affections of the young than of the old, and in diseases occurring in individuals of a

[1] See the Author's Manual of the Practice of Medicine. Second edition, page 148.

[2] See Copland's Medical Dictionary: Article *Delirium*.

nervous temperament rather than in those of the sanguine. It is said to be active or passive; the former—as a rule having many exceptions—being characteristic of the existence of inflammatory action; the latter—under the same circumstances—resulting from exhausted nervous and vital power. The *active* differs greatly in degree, being sometimes mild, sometimes violent or furious; in the mild form there is generally mental aberration without any disposition to action; in the furious grade, there is violence of manner, voice, and language. In *passive* delirium the mind appears to be wandering; the patient mutters sentences without meaning, but will answer questions coherently and correctly if roused, or if the circulation be quickened by a stimulant: the low muttering wandering of typhus is a good example of this form of delirium.

In inflammation of the brain the raving is often very violent. Cases of encephalitis, characterized by *early and fierce* delirium, are generally those in which the inflammatory action has invaded the whole of the encephalon, cerebral substance and the meninges simultaneously. When delirium occurs during the progress of a case of pneumonia, it is a very ugly symptom, since it generally denotes that the pulmonary affection is largely interfering with the due arterialization of the blood. Delirium tremens is generally characterized by a busy, but not angry or violent delirium; the patient is constantly talking or muttering, his hands tremble, and his manner is eager and excited. If you question him, he answers rationally, though in an agitated manner, but he soon relapses, and his mind wanders from the scene around him. His thoughts usually appear to be distressing, and he is full of anxiety, either as to his business or family, or the supposed devices of some enemy determined to injure him. He looks about him suspiciously, distrusts those near him, imagines that vermin or various animals are running over his bed, or that strangers are in his room to hurt him. These fancies are often driven away by a sound refreshing sleep, which, however, there is usually great difficulty in obtaining. In all cases, the aphorism of Hippocrates is true,—"When sleep puts an end to delirium it is a good symptom."

Coma.—Coma is that condition of complete insensibility in which the functions of animal life are suspended, with the exception of the mixed function of respiration; while the functions of organic life, and especially of the circulation, continue in action. There is neither thought, nor the power of voluntary motion, nor sensation; but the pulmonary branches of the par vagum continue to excite, through the

medulla oblongata, the involuntary movements of the thorax. When this upper part of the cranio-spinal axis becomes involved in the disease, and its reflex power ceases, the breathing stops also, and the patient is presently dead.[1]

On being called to a case of deep coma there will often be experienced great difficulty in deciding whether this condition is due to apoplexy, or to a large dose of opium, or to a poisonous quantity of alcohol. All physicians engaged in hospital practice have seen cases in which they have been placed in this dilemma,—a most unhappy one, since the life of the sufferer may depend upon the correctness of the diagnosis. The points which will assist the practitioner in forming an opinion are,—the history of the patient, his general appearance, and such other circumstances as can be gleaned from his friends, or those persons who picked him up in the street; the smell of his breath,—the odor of tobacco, of spirits, or of wine, being often easily detected; his condition in life; and the state of his mind for the previous few days. In cases of poisoning by opium, however, the pupils are almost invariably contracted, sometimes to the size of a pin's point; in deep intoxication they are often dilated, but sometimes contracted; and so in apoplexy. When house physician to King's College Hospital I saw more than one case of profound coma caused by dead-drunkenness, which was quickly relieved by having recourse to the stomach-pump, administering two or three ounces of the liquor ammoniæ acetatis, and afterwards employing cold affusion. The diagnosis of intoxication is often difficult, for though the odor of the breath is one of the best means of throwing light on the case, yet it must be remembered that a fit of apoplexy or epilepsy is very likely to occur in a plethoric predisposed person after a glass or two of spirits.

[1] Dr. Watson, op. cit. vol. i, p. 481.

CHAPTER VI.

ON THE DIAGNOSIS OF NATURAL FROM FEIGNED DISEASE.

In every age and in every country disease has been simulated by all classes of society. Numerous examples to prove the truth of this assertion might be quoted from the Scriptures as well as from ancient and modern history, but such instances would prove more entertaining than useful. Suffice it to say that the monarch, the statesman, the priest, the soldier, and the criminal have alike feigned mental and bodily infirmities for the advancement of their own ambitious or nefarious designs. In the present day the majority of these impostors are found amongst persons suspected of crime, vagrants, sailors, soldiers—a soldier feigning illness is said to be *malingering*—members of benefit societies, children, and such hysterical and capricious women as, having no healthy occupation, amuse themselves by simulating cardiac, pulmonary, spinal, or uterine disease.

In the investigation of this class of cases great discrimination and ingenuity will be required, since the actors in these deceits generally play their parts with considerable skill, and often with a total disregard to trouble or even physical suffering. There are four modes in which disease may be said to be simulated:—1. Disease may be altogether feigned, the person being in a state of health. 2. It may be exaggerated; that is to say, there being a certain amount of disease, the patient may pretend that it exists in a greater degree and causes more disturbance and suffering than it truly does. 3. Disease may be artificially excited, sickness being actually produced either by the patient, or with his concurrence.[1] And, 4. Disease may be artificially increased or aggravated during its course.

The accompanying table exhibits the diseases which are most frequently simulated, the mode in which they are feigned, and the means to be adopted for their detection.

[1] Robertson, in his History of Charles the Fifth (Book xi), tells us of Pope Julius III, who feigned sickness to avoid holding a consistory, and, in order to give greater color to his imposture, confined himself to his apartment, and changed his usual diet and manner of life. So effectually, however, did he play his ridiculous part, that he contracted a real disease, of which he died in a few days.

A TABLE OF FEIGNED DISEASES.

DISEASE.	MODE OF SIMULATION.	MODE OF DETECTION.
1. Abdominal Tumors.	By paddings worn in the dress; by pusbing the abdomen forward while in the erect position; and by elevating the spine when lying on the back. Also by making the recti muscles rigid. In the "Dictionnaire des Sciences Méd." a case is mentioned of a young soldier who produced abdominal distension by swallowing air: "par le moyen d'éructations bruyantes et non interrompues, par haut et par bas." he got rid of his tympanitis at will. Allowing constipation to continue many days might cause such a collection of faeces as would assume the feel of a tumor.	Examine the abdomen uncovered, and produce relaxation of muscles, by raising and drawing up the patient's knees. Administer nauscous and anti-flatulent purgatives.
2. Abortion.	By staining the clothes and body with blood.	A vaginal examination; appearance of the areolæ around the mammæ, &c.
3. Abstinence.	Often feigned for exciting wonder or pity. The most recent case that I know is that of Elizabeth Squirrell, of Shottisham, in Suffolk, who, in 1852, led her neighbors to believe that she had lived solely upon air for rather more than four months. Instances of abstinence protracted for some days are not rare. Thevenot asserts that the Arabs can remain five days without food, and other authorities report that the Tartars support abstinence for sixteen, seventeen, or even eighteen days. Cheyne states that a phthisical patient lived thirty days upon water with a little nitre in it. A prisoner at Toulouse determined to starve himself: from the 15th April, 1831, to the 17th June, when he died, he drank only a little water, and sometimes his urine, taking nothing else whatever. Magendie's experiments upon animals belonging to genera near to man, show that they cannot support life without food or drink beyond fourteen or fifteen days.	Very difficult of detection. Attentive watching, and trouble to a greater extent than the cases merit, must be trusted to.
4. Aphonia.	Partial loss of voice is very rarely feigned, which is somewhat remarkable, since the simulation would be very easy, and the mode of detection difficult. True aphonia generally results from tumefactions of glottis and fauces, from relaxation of the chordæ vocales,	The impostor may be suddenly awoke in his sleep, or placed in a room alone and his fears excited, when he will probably involuntarily make an exclamation. By the absence of any

	from tumors of neighboring parts compressing the trachea, and from mechanical division or paralysis of the nerves distributed to the tongue and larynx. It sometimes precedes, sometimes succeeds, apoplexy.	physical cause. *See Gavin on Factitious Diseases.*
5. Apoplexy.	By falling down suddenly, as if deprived of sensation and consciousness, and lying as though dead.	Powerful stimulants, sternutatorics, electric shocks, &c. The use of the actual cautery may be proposed in the impostor's hearing.
6. Asthma.	Difficulty of breathing, increased on making any exertion; cough; expectoration; palpitation.	The stethoscope will detect the presence or absence of disease. Watch the patient, unseen by him.
7. Blindness.	Amaurosis is the form generally assumed, which, being mostly characterized by a fixed and dilated pupil, this condition is obtained by the use of belladonna or its alkaloid atropine. Montaigne tells us of a Roman who put a plaster over one eye, to counterfeit blindness; after wearing it some time, he discovered, on removing it, that he really had become what he had feigned to be.	Watching the patient without his knowledge. Where belladonna has been used, we must wait for some days—even nine or ten—until its effects have ceased, putting supplies of this agent out of reach.
8. Cachexia, Emaciation, and Debility.	Cachexia Africana, or pica Africanorum, formerly produced the most extensive ravages amongst the West Indian slaves. It is generally a compound of real and factitious disease, the disorder of the stomach perhaps prompting to the practice of dirt-eating. The disease is truly a cachexia producing pallor and emaciation. and subsequently dropsy. General debility is sometimes produced by drinking freely of spirituous liquors, and by foregoing sleep for a time prior to examination.	By examining the matters vomited after the exhibition of emetics, or by inspecting the stools, which will be found to consist chiefly of the earth swallowed. Debility from other causes will be discovered by retaining the party under observation.
9. Calculi in the Bladder.	Young women and others will introduce cinders, pieces of bone, and common gravel, &c., into the vagina, and even into the urethra and bladder, to simulate this disease.	Easily detected by removing and examining the foreign substance.
10. Cancer.	The smooth surface of half of the spleen of an animal has been glued to the skin, giving the appearance of a malignant ulcer.	A careful examination will alone suffice.
11. Catalepsy.	Has been feigned, generally, in some of its imperfect varieties, by soldiers, sailors, and hysterical masturbating women.	Propose the use of the actual cautery. John Hunter suspended from the stretched-out hand, a string, with a small weight attached to it, and suddenly cutting the thread, observed whether the arm was abruptly raised, as it would be by an impostor.
12. Chorea.	By assuming those constant, absurd, convulsive movements which	Watching the patient without his know-

DISEASE.	MODE OF SIMULATION.	MODE OF DETECTION.
	characterize this disease. It requires good acting to imitate this affection closely. Baglivi, who states that symptoms similar to those of chorea arise from the bite of the tarantula or venomous spider, asserts that women frequently counterfeited this affection in order to enjoy the music and dancing provided for those really afflicted with it	ledge. Suddenly awakening him, and observing if the movements at once commence.
13. Convulsions.	In the west of Scotland, in 1742, attacks of convulsions—occasioned by religious excitement and enthusiasm—became almost epidemic. Such was also the case in Cornwall, in 1813 and 1814. Many of the Jansenists—the Methodists of France—who made pilgrimages to the grave of Deacon Paris during their persecution in 1724, and were there seized with fits, were doubtless impostors; but it cannot be denied that many credulous zealots actually worked themselves into convulsions by the force of their imaginations. Nervous convulsive movements of the muscles of the face and other parts of the body are often feigned.	The stiffness of the muscles, and the resistance and rapidity of action which appear in the real disease, are absent. Watch the suspected person without his being aware of such surveillance; he will seldom persist in making irksome movements, when no advantage is to be gained by the performance.
14. Cutaneous Eruptions.	An ointment of tartar emetic, croton oil, &c., will give rise to a pustular eruption, which, after a few days, will slightly resemble impetigo. A young woman in King's College Hospital, during the time I was house physician, produced a very good imitation of pompholyx by the inunction of powdered cantharides. Urticaria will often arise from eating shell-fish, bitter almonds, &c.	Careful examination and search for the particles of cantharides, &c.
15. Death.	Carden tells us of a priest who could simulate death at will, with no sign of respiration, and in whom no appearance of sensation could be produced by pricking, tickling, or burning. Dr. Cheyne, in his "English Malady," states that the Hon. Colonel Townsend was able voluntarily, so to retard or stop the functions of respiration and circulation, that the action of neither could be perceived. In the "Memoirs of Vidocq," mention is made of a prisoner who counterfeited death so well and so often, that when he actually expired, two days elapsed before the jailers were convinced and would remove his iron collar.	By the deficiency of the respiratory movements, the cessation of the motions of the heart, and by the complete loss of tone and irritability. In doubtful cases, therefore, hold a fine feather, or the flame of a candle, before the nose and mouth, auscultate the heart, and try if blood will flow on opening a vein. Irritants, moreover, will not redden the skin in the dead. Dr. Josat (De la Mort et de ses Caracteres) concludes from his researches, that there is no single sign of death which can be

16. Deafness and Deaf-Dumbness.

Impostors generally lose their hearing suddenly, whereas the real disability takes place gradually. Occasionally, deafness is caused by inserting a pea or other foreign body in the ear. The gestures and expression of countenance of the deaf and dumb are difficult to assume. All my readers must remember the pretended deaf mute described by Sir Walter Scott, in his introduction to "Peveril of the Peak," who acted her part so well, for three or four years, that she remained unsuspected until one Sunday—coming suddenly upon a boy appropriating a nicety to which he was unentitled—she exclaimed, "Ah, you little devil's limb!"

17. Deformity.

The deformities and malformations most frequently simulated, are contractions of the finger, elbow, ankle and knee joints; shortness or distortion of a limb; inversion of the feet; curvature of the spine; and wry-neck. A convict at Woolwich shirked his work by keeping his right knee bent, so as not to touch the ground with his foot, for the whole period of his punishment, seven years; at the end of this time, on being discharged, he impudently remarked.—"I will try to put down my leg, it may be of use to me now." He did so, and walked off with a firm step. Several cases have been reported of females who have produced serious swellings, abscesses, &c., by the introduction of numerous needles into the parts.

18. Delivery.

After the existence of artificial abdominal enlargement, and the sudden subsidence thereof, it has been pretended that delivery has taken place, either for the purpose of extorting charity, compelling marriage, or disinheriting parties who have claims to an estate. The external parts of generation are moistened with borrowed blood, and the infant of another substituted as the female's own.

regarded as conclusive except putrefaction, which opinion appears to be borne out by M. Deschamps (Du Signe Certain de la Mort), who regards green discoloration of the abdomen—the first sign of decay—as a certain sign of death.

Examine the ear. Deaf people require you to speak slowly and distinctly; impostors only demand that you shout when addressing them. Place the patient under the influence of chloroform: during its exhibition, or as its effects are going off, the impostor will in all probability declare himself.

For pretended contractions of the muscles or joints, a tourniquet should be affixed above the affected part, and tightened to an extent sufficient to render the muscles incapable of acting; the joint will then be found easily movable. In the same way factitious shortening of a limb from any cause may be detected; or the limb may be straightened while the impostor's attention is withdrawn, or while he is under the influence of chloroform.

After real delivery the vagina will be found relaxed, as will the os uteri, which is also tumid and tender; there will also be a lochial discharge. Beyond the sixth day it will be difficult to draw any conclusions from a vaginal examination. The areolæ around the nipples will be very dark; and the breasts should contain milk. The abdominal integuments are also flaccid, and present a peculiar appearance for several days after labor.

DISEASE.	MODE OF SIMULATION.	MODE OF DETECTION.
19. Diarrhœa and Dysentery.	Are often feigned, especially by soldiers and sailors in warm climates. Mr. Hutchinson states that he has known convicts break down in their urinary utensils a healthy evacuation, and intimately mix it with the urine, so as to imitate a diarrhœal stool, or add blood to it, procured by pricking the gums, so as to simulate dysentery. Mucous discharges are produced by introducing suppositories of soap or of some more irritating substance into the rectum: blood is sometimes subsequently mixed with these. Sulphate of iron is occasionally taken to render the stools black and unhealthy-looking.	The patient must be made to use a night-chair, his proceedings must be closely watched, and care must be taken that he does not obtain blood by picking his gums, nose, &c.
20. Dropsy.	The French conscripts are said to have actually injected water into the peritoneum, and thereby produced factitious ascites. Anasarca of the extremities has been frequently caused by ligatures artfully concealed. Several instances have been mentioned of mendicants who have daily blown air under the scalp of children through a small opening at the vertex, giving rise to great distension, simulating hydrocephalus.	When a ligature has been applied it will always leave a mark, at once telling the tale. A careful examination will generally detect the other impositions.
21. Dyspepsia.	Marshall says that many men have been discharged from the army in consequence of real or simulated dyspepsia. When feigned, we shall seldom find all the symptoms present, neither will the general health appear to suffer in a proportionate degree. Some persons can vomit at pleasure, by pressing on the region of the præcordia, and they avail themselves of this faculty when simulating disease of the stomach. They also privately supply themselves with food which they do not vomit.	Difficult of detection, and often impossible where there is a certain amount of disease with great exaggeration. It may probably be advisable not to discharge any man from the army or navy for dyspepsia, unless we are convinced that there is some organic disease of the stomach or viscera.
22. Dyspnœa.	Difficulty of breathing alone is seldom simulated.	Watch the person when asleep.
23. Ear—Diseases of.	Those diseases of the ear which produce a discharge (otorrhœa) have been *simulated* by putting honey, or pus, or rancid tallow, &c., into the external meatus; they have been *excited* by introducing powdered cantharides or other acrid substances.	Careful examination will alone be necessary.
24. Epilepsy.	A feigned attack of epilepsy always occurs at some opportune time and place: the convulsive contractions do not take place simultaneously over different parts of the body; the impostor opens	In true epilepsy there is complete insensibility to all external agents. Mr. Hutchinson completely cured a malingerer by blowing a

his eyes occasionally to observe the effect of his acting upon the hystanders; he cannot produce the contorted face, and red, bloated countenance of the true epileptic; the skin becomes hot and covered with perspiration, whereas in real cases it is generally cold and clammy; and the termination of the disease is abrupt, the stupor, vertigo, and succeeding exhaustion being imperfectly evinced in the simulated disease. Foaming at the mouth is often produced hy a piece of soap kept under the tongue. In the feigned discase the impostor makes no attempt to conceal his malady, and courts publicity; with the real epileptic it is always the reverse, he being anxious to hide his infirmity.

quilful of fine Scotch snuff up the nostrils, which produced a violent fit of sneezing. The fear of pain or danger, excited by the proposal of an operation in the patient's hearing, will often cut short a feigned attack. In doubtful cases, the practitioner must he very guarded in giving an opinion, and should never sanction recourse being had to punishment.

25. Fever.

This disease may be feigned or artificially produced. Fodere states that some persons can readily simulate fever, being ahle to produce great frequency of pulse, chattering of the teeth, and deep sighs. In order to give an unhealthy appearance to the tongue, it has been covered with soap, flour, chalk, dust, pipeclay, brickdust, tobacco, whitening from the walls, &c. Redness of the skin has been produced hy friction with a hard brush.

Where the febrile paroxysm is due to intoxication, &c., it is only ephemeral, and one or two days' examination develops the deceit. Should the tongue he artificially coated, rinsing the mouth with warm water will clean it. The general condition of the system will he found incompatible with the truth of the symptoms.

Fever may be really temporarily produced by brandy, wine, tobacco, cantharides, &c. Ague is sometimes simulated, but the exertions of the individual convert the cold into the sweating stage.

26. Fistula in Ano.

Has been feigned by making an incision near the margin of the anus, and introducing an acrid tent into it. The courtiers of Louis XIV feigned fistula in ano, in order to resemble their sovereign; and coming under the hands of ignorant surgeons, who pierced the intestine, they really acquired the disease.

The parts must be carefully examined.

27. Hemorrhages.

Hemorrhages from the lungs, stomach, or kidneys are often simulated. *Hæmoptysis* is feigned by coughing, and coloring the saliva with blood from the gums, or with some foreign substance, as vermilion, Armenian bole, brickdust, &c. Factitious *hæmatemesis* has been produced hy swallowing bullock's or other blood, and then causing vomiting. Sauvages relates the case of a girl who, to escape from a convent, brought up, in the presence of the physicians, several pounds of blood, on several successive days; it was at last discovered that she secretly drank bullock's blood before the expected visit.

A careful examination of the patient hy the stethoscope, of the symptoms, and of the sputa, will detect the deceit. The patient must also be watched, and care taken to prevent the possibility of his obtaining the materials necessary for the simulation.

DISEASE.	MODE OF SIMULATION.	MODE OF DETECTION.
	Hæmaturia has been simulated by taking substances which have the power of reddening the urine, as the fruit of the prickly pear, madder, beet-root, &c. Blood has also been mixed with the secretion, after it has been voided; and has even been injected into the bladder.	
28. Hemorrhoids.	The discharge of blood from the anus is readily feigned. Hemorrhoidal tumors have been constructed of the bladders of fish, &c., inflated, tinged with blood, and introduced into the rectum.	No medical man will be deceived by these artifices.
29. Hepatitis.	This affection is frequently simulated by soldiers in India, wishing for their discharge; and as they are aware of the symptoms, and learn to tell a consistent tale, there is some difficulty in detecting the imposition. Dr. Cheyne says:—"When men who have not been in warm climates obstinately complain of pain in the right hypochondrium, and when we cannot discover any enlargement or fulness of the liver, when the pulse and breathing are undisturbed, the secretions and excretions natural, and when the alleged pain resists topical bleeding and blistering, and mercurial purgatives, the sooner we send them to duty the better."	The countenance and general appearance will be found at variance with the oral testimony. The absence of enlargement of the liver will be suspicious, though serious disease may exist without it.
30. Hernia and Hydrocele.	Both of these diseases have been simulated by inflating the cellular tissue of the scrotum with air. Some men have the power of retaining the testes in the groins by the voluntary action of the cremaster muscles, and so give rise to a swelling, which has been mistaken for hernia.	Detection is easy.
31. Hydrophobia.	MM. Percy and Laurent mention the case of a conscript who feigned hydrophobia, and at first misled the examiners, but who was cured by the threat of suffocation between two beds.	The case related suggests the course to threaten.
32. Incontinence of Fæces, &c.	Incontinence of fæces and of urine has been simulated, to obtain discharge from the public service. Dr. Cheyne alludes to an English regiment in which impositions of this kind were common, owing to the ease with which the soldiers found themselves able to impose upon the regimental surgeon.	If the sphincter ani contracts upon the finger, and the fæces are still passed involuntarily after a dose of opium and solid food, there can be no doubt as to the presence of imposition. In incontinence of urine, supply an elastic urinal, such as is made for railway travellers, and make the man do his duty.

33. Insanity.	Madness is often feigned by those accused of crime. In general the part is over-acted, the person does too much, is too violent, or too simple, and betrays himself not only by inconsistencies of conduct and language, but by forgetting his feigned character when awaking from sleep, or when he deems himself unseen. The attack too, is in general, sudden, without any obvious cause; there is no history of a tendency to insanity; and the previous conduct to neighbors, &c., has been rational. In true insanity, the madman will not allow that he has any mental or corporeal disease; he will regard your visits as intrusions; and he will often talk rationally on many subjects. The impostor does all he can to make you believe he is mad; he is violent and incoherent; he talks absurdly on all topics; and he makes exertions which fatigue him, though the true maniac knows not fatigue until thoroughly prostrated. A maniac sleeps but little—an impostor soundly; the former often refuses food—the latter seldom. In the insane, the bowels are torpid—as a rule, the pulse frequent and feeble, and there is a disregard to the affections, comforts, and decencies of life. The expression of countenance of the insane, moreover, can be but feebly mimicked.	Observe when the insanity was first assumed; it will generally be *after* the commission of crime, and *after* the individual has been suspected. Watch the person frequently, and unseen by him. Low diet, solitary confinement, and repeated counter-irritation will sometimes tire the impostor. The indications and characters of mental alienation ought to be carefully studied by every medical student in a large asylum: knowledge so gained will aid him in detecting feigned insanity more than all the precepts I can lay down for his guidance.
34. Jaundice.	A yellow color has been given to the skin, by tinging it with infusion of turmeric; muriatic acid has been used to make the stools clay-colored; and rhubarb, to heighten the color of the urine. Spirits have also been taken largely to produce heat of skin, disordered tongue, and rapidity of pulse.	Washing the skin removes the coloring matter, and the excretions become healthy on cutting off the supplies of acid, &c. Moreover, the white of the eye cannot be colored by art.
35. Menstruation.	By staining the body linen, napkins, and organs of generation with borrowed blood.	By cutting off the supply.
36. Ophthalmia.	Soldiers and others have produced ophthalmia, by rubbing the conjunctiva with powdered corrosive sublimate, alum, salt, snuff, lime; by sand or other hard bodies, and by pulling out the eyelashes. The right eye is most frequently tampered with, since it is the most important in using the musket or rifle.	The patients must be secluded and watched. When—as in the navy—seclusion is impracticable, a strait waistcoat has been used to prevent applications being made to the eye.
37. Pain.	Neuralgic, rheumatic, and other pains are often simulated, and detection is difficult. A remarkable case is recorded of alleged pain in the mamma, in a female mendicant, who went so far as to solicit, and actually obtained, amputation of first one breast and then the other. She then wished a hand removed, but the imposture was	Listen attentively to the patient's narrative, examine the part complained of carefully, cross-examine him with apparent good faith and simplicity, and he will admit the existence of any symptom, however absurd.

DISEASE.	MODE OF SIMULATION.	MODE OF DETECTION.
	discovered. A ludicrous case of simulated tooth-ache is recorded in "The Gold-Headed Cane."—"The conversation having turned on Russia, the Prince spoke of a certain courtier there, who, when Biron was disgraced, said, 'Ay, that fellow was the cause of my losing two of my teeth.' 'How so?' said somebody. 'Why, because a dentist came here whom he patronised; and, in order to pay my court to Biron, I sent for that man to draw two of my teeth.'"	Where the case is not clear, however, it is always better to act as if the sufferings were real.
38. Palpitation.	Heart affections have been often simulated. White Hellebore, in ten or twelve grain doses, has been employed to produce vomiting, purging, syncope, nervousness, and palpitation. In one instance a ligature was bound round the neck so tightly, that a livid and swollen countenance and disordered action of the heart resulted.	The patient must be examined both by inspection and auscultation. He must be prevented from obtaining any deleterious drugs.
39. Paralysis.	It is always a suspicious circumstance, in healthy adults, when the loss of power is confined to a single limb—the arm, for example, as such a form of paralysis is rare. In a case detected by Dr. Cheyne, his opinion that the disease was feigned was founded on the following considerations, viz., there existed no other signs of disease; the countenance indicated health and intelligence; the function of the brain was undisturbed, and all the senses were entire; paralysis of the arm is a complaint frequently feigned by soldiers, but it is very rare in reality.	Feigned palsy has been detected by subjecting the patient to a powerful electric shock. A case occurred in the New York State Prison which resisted all medicines: upon applying an electric shock the patient jumped up, ran into the hall, and asked for his discharge from the infirmary. During sleep on irritating the affected limb, it will be drawn away in factitious cases.
40. Peritonitis.	Inflammation of the peritoneum is often feigned, especially perhaps by hysterical women. Great pain over the abdomen is complained of, the slightest pressure is said to give agony, and the patient excites herself until her skin becomes hot and pulse frequent.	Engage the patient in conversation—excite her attention, and then make pressure upon the abdomen: a simulator will feel no pain and utter no complaint. Examine pulse, expression of countenance, &c.
41. Phthisis.	Tubercular disease of the lungs would appear to be one of the least likely affections to be feigned, the peculiarity and complexity of the symptoms, and the wasting of the body, seeming to render hopeless any scheme of fraud. Yet phthisis has often been simulated, especially after recovery from other diseases, when pain, cough, and debility are readily assumed, and artificial hæmoptysis induced.	An acquaintance with the phenomena of the real disease, and a physical examination of the chest, will enable the physician to distinguish between true and false phthisis.

42. Pregnancy.	Pregnancy has been feigned to gratify the wishes of the husband or relations, or to extort marriage. On the authority of Madame de Crequy, it may be noticed, that after the first French revolution, a society was formed in Paris, the members of which imitated the costumes and manners of the ancient Greeks and Romans. At this time there was much talk of patriotism, and of the want of children for the republic. The ladies all aspired to the glory of producing citizens. Those who were *enceinte* made the greatest display of their condition, while those less fortunate invented a style of dress which should, at least, give them the reputation of being so. Occasionally a woman will deceive herself, and believe that she is pregnant without any just cause. I remember being summoned to attend a lady, said to be in labor. On arriving at the house I found everything prepared, the nurse in attendance, and the patient suffering from what she termed labor-pains. Yet, on examination, it was proved that she was not even pregnant, and that the abdomen was merely enlarged from fat and flatus.	Examination of the breasts, and per vaginam, will always detect the imposition.
43. Rheumatism.	Rheumatism, gout, lumbago, and sciatica, are often feigned by members of benefit societies, and others wanting to shirk work. The sufferings are generally described as too acute, and the part is altogether over-acted. It was probably in reference to gout that the poet Young sang, in his "Love of Fame." "Polite diseases make some idiots vain, Which, if unfortunately well, they feign."	Attention to the constitutional symptoms, and noting their absence in factitious cases, will generally lead to a correct diagnosis.
44. Ulcers.	Œdema of the legs has been produced by applying a ligature round the thighs.	Examine the limbs uncovered.
45. Swelling of the Limbs.	Ulceration has often been produced by cantharides, lime, and other irritants. They have also been simulated by gluing a piece of spleen on the part.	Such ulcers are readily healed.
46. Urine—Foreign bodies in.	This has always been a favorite source of deception. The fruit of the Indian fig colors the urine as red as blood. Cantharides will render it scanty, high colored, and of high specific gravity. Milk, sand, fatty matters, &c., are often mixed with this secretion. The excretion of gravel is often feigned.	The microscope will discover most impositions, as when sand, starch, milk, and flour, have been added. In milk we find oil-globules; in chylous urine there is fatty matter in a molecular state, but not a single oil-globule. The patient should be made to pass his urine in the presence of the surgeon.

In considering the facts narrated in the foregoing table we find much to excite our wonder and regret; and without indulging in any morbid or sentimental feelings, I think it impossible not to come to the conclusion that many, especially in civil life, who practise the deceptions detailed, at least do so from folly and imbecility, as much as from vicious and wicked motives. In treating such cases, therefore, it is not for us at once to condemn or assume too harshly the characters of judges. The constant practice of our profession makes us acquainted with so much that is morally blamable, and teaches us so forcibly the weakness of man and the proneness of the best of us to err and trespass—for there is no "happy valley" where sin and sorrow are unknown, save in the fiction of Rasselas—that we cannot but pity those who come under our care from diseases self-inflicted or even simulated. Although, consequently, the conscientious practitioner will not allow himself to be imposed upon, yet he must not rest satisfied with merely discovering the deceit; but remembering that the quality of mercy is such, that it "blesseth him that gives and him that takes," and bearing in mind how much we all stand in need of a merciful interpretation of our daily conduct, he will readily learn to make allowances for those who have succumbed to temptation; and by kindness, gentle reasoning, and attempting, as far as in him lies, to smooth their path of life, endeavor to lead them to a more healthy tone of thought, and to teach them that however exalted or however humble their occupation, still if they do their duty in it to the best of their abilities, they must prove useful and valuable members of society, and will be rewarded accordingly.

CHAPTER VII.

ON THE PHYSICAL DIAGNOSIS OF DISEASE.

The existence of disease involves the presence of physical or anatomical change, sometimes confined to the part originally affected, but often extending to the adjoining structures. "The anatomical changes thus arising," says Dr. Walshe, "may or may not be capable of accurate discrimination during life. When they can be so discriminated, experience has shown that their detection is not so much accomplished by means of

the vital functional derangements of the organs implicated, as by the aid of various alterations in the physical properties of those organs,—as, for example, their density, their faculty of generating and of conducting sound, &c. So invariably do these alterations bear a certain and fixed relation to the physical nature of the anatomical conditions with which they are associated, that the discovery of the former is conclusive as to the existence of the latter. And not only the physical nature, but the precise limits and the precise degree of these conditions are disclosed by the alterations referred to, which, for these reasons, constitute their *physical signs*. Interpreted by the observer, and not by the patient,—incapable, except in the rarest instances, of being feigned, dissembled, or even modified at will,—estimable in degree and extent with almost mathematical precision,—susceptible of indefinite refinement,—physical signs, like the whole class of objective phenomena of disease, are of immeasurably greater diagnostic, greater general clinical value, than its subjective symptoms. Physical signs are, in fact, the true indices of the physical nature, extent, and degree of textural changes, and may be regarded as instruments of pursuing morbid anatomy on the living body. . But just as their significance is sure and precise, so is the difficulty of mastering their theory and practice positive and great; and hence it is that physical diagnosis has gradually acquired for itself the importance of a special art." [1]

SECTION 1. THE PHYSICAL DIAGNOSIS OF CEREBRAL DISEASES.

A few years since Dr. John Fisher and Dr. Whitney, of the United States, published some observations on Cerebral Auscultation,[2] which, though they do not appear to have attracted as much attention as they merit, are yet deserving of our notice, since the diseases of the brain are generally so obscure, and their diagnosis—resting solely upon the plausibility of physiological and pathological induction—is beset with so many difficulties, notwithstanding the great advances which have been made in the study of the nervous system, that any attempt to increase the knowledge of this class of affections is welcome, and deserving of careful consideration. That

[1] A Practical Treatise on Diseases of the Lungs and Heart, Second edition, p. 2.

[2] American Journal of Medical Science, vol. xxii, p. 277, and vol. xxxii, p. 283.

practitioners should attempt by auscultation to ascertain the various conditions of the parts within the thick-walled skull under the influence of disease might naturally be expected, especially when so much was daily being learnt—by the same means—of pulmonary and cardiac affections. Neither does it seem at all improbable at first sight that, e. g., in the case of aneurisms of the cerebral arteries—the internal carotid, the vertebral, or the basilar—the careful use of the stethoscope might reveal the existence of a bellows-murmur, and so very materially facilitate their diagnosis.

In practising cerebral auscultation, the person to be examined should be in a horizontal position, with his head supported by a pillow; if it be a child, the examination can be most satisfactorily made while it is asleep. In auscultating the heads of healthy children, four different and perfectly distinct bruits are heard passing through the brain, consisting of the sounds produced by the acts of respiration and of deglutition, and by the impulse of the heart and the voice. The first which attracts attention is *the cephalic sound of respiration*, commencing and terminating with the respiratory act, and produced "by the impinging of the air against the wall of the nasal cavities during the act of respiration." The second sound is that of the heart, the impulse which strikes the ear seeming to be transmitted from a distance: it has been called *the cephalic sound of the heart*. The sharp, piercing, and vibratory sounds which accompany the act of crying or speaking, and which can be heard over every part of the skull, is termed *the cephalic sound of the voice;* while the remaining one of the normal sounds of the head is a peculiar, dull, massive, liquid sound, attending the act of deglutition, and known as *the cephalic sound of deglutition*. As age advances, and the density of the brain and cranium increases, these sounds become modified and somewhat indistinct, while in disease they become remarkably altered, as we shall now see.

The auscultic phenomena which have been described by Drs. Fisher and Whitney as characteristic of particular pathological states of the encephalon are four,—i. e. 1, the cephalic bellows-sound; 2, the encephalic or cerebral ægophony; 3, the *frémissement de cataire*, or purring thrill; and, 4, the *bruit de poussin*, a cooing or musical sound.

The chief of these, the *cephalic bellows-sound*, can be most distinctly heard in certain of the cerebral affections of children, by placing the stethoscope over the anterior fontanelle. It has its seat and origin in the arteries, and probably in those

situated at the base of the brain. In most cases it seems to be due to compression of these vessels, but any cause which narrows the artery, as inflammation, ossification, &c., or indeed any condition which produces an inequality or disproportion between the size of the vessel and the quantity of fluid to pass through it, will give rise to it. The sound is loud, coarse, abrupt, and rasp-like; it is synchronous with the pulsations and impulse of the heart and large arteries, and with the pulsatory motions of the fontanelle; compression of carotids renders it feeble and indistinct; and nothing resembling it can be heard in the arteries of any other part of the body.

The cephalic bellows-sound is not a phenomenon of health. It cannot be detected in the heads of children or adults who are free from disease, but it has been discovered in cases of cerebral congestion, acute inflammation of the encephalon, hydrocephalus, induration of the brain, and ossification of the cerebral arteries. To discover this murmur is said to be in many instances a matter of no small difficulty, and hence may be explained the fact that many observers have failed to detect it, even after repeated examinations.

The second sound—the encephalic or cerebral œgophony—has been noticed only in those cases of cerebral disease which are accompanied with effusion and extravasation of fluid over the surface of the brain. "In every instance," says Dr. Whitney, "in which I have noticed this hitherto undescribed cephalic phenomenon, it has been connected, and existed only with a state of effusion and extravasation of fluid *over the surface of the brain.* I have never been able to detect this change in the character of the voice, *in simple effusions into the ventricles,* nor in any acute or chronic lesion of the brain, except accompanied with effusion and extravasation; consequently I have been led to consider an extravasation of fluid over the surface of the brain as a prerequisite to the development of this phenomenon. Such a state of the brain, moreover, accords with a similar state which is known to accompany a similar phenomenon of the lungs. It is owing, therefore, to the natural resonance of the voice being rendered more shrill and brazen by its transmission through a thin layer of fluid in a state of *vibration.*"[1]

The third sound—the frémissement cataire, or purring thrill, has been heard only in one case of aneurism of the basilar artery, and was supposed to be due to the disease of the arterial tunics.

Lastly, *the fourth sound—the bruit de poussin, or cooing or*

[1] Op. cit. p. 326.

musical sound may be considered simply as a modification of the bellows-murmur, seated in the arteries, and occurring in cases of anæmia where the supply of blood to the brain is imperfect or deficient.

The foregoing remarks contain all that is important in the writings of Drs. Fisher and Whitney on cerebral auscultation, as well as all that I can glean from other sources. The reader will perceive that although much has not yet been accomplished, still something has been done, and it is certainly as well that he should be acquainted with the attempts that have been made. With regard to the results said to have been obtained from the practice of percussion in cerebral disease I hold the opinion of Zehetmayer, that percussion will undoubtedly inform us of the thickness of the skull, but up to the present time, thick and hollow heads have been detected with tolerable certainty without the necessity of percussing the cranium.[1]

SECTION 2. THE PHYSICAL DIAGNOSIS OF DISEASES OF THE LUNGS AND HEART.

Introductory Remarks on the Structure of the Lungs.—The lungs—the organs of respiration—are contained in the cavity of the thorax, one on either side of the spine. They are irregular conoid bodies, the bases of which rest upon the diaphragm, while the apices project upwards, extending slightly above the level of the clavicles. Between the fourth and fifth ribs, near the left edge of the sternum, a small oval-shaped space is left between the two lungs, where part of the pericardium remains uncovered, the remainder of the pericardium and heart being received into a depression in the inner surface of the left lung. The right lung, somewhat broader but shorter than the left, owing to the position of the liver, is divided into three lobes; the left into two.

The lungs are formed of—1, *bronchial tubes*—composed of cartilaginous rings, muscular fibres, and of mucous membrane covered with vibrating ciliated epithelium—which commence at the bifurcation of the trachea, divide and ramify through the lungs, and terminate in—2, the *bronchial intercellular passages*, which, according to Mr. Rainey, are simply passages running between, and communicating in all directions with—3, the *air-cells*, or *lung-vesicles*. These air-cells are small, generally four-sided cavities, communicating either directly with the intercellular passages and bronchial tubes by large circular apertures, or indirectly through the medium of other

[1] Grundzüge der Percuss. und Auscult. p. 41.

cells; the cells in the central parts of the lungs are smaller but more vascular than in the peripheral portions. The pulmonary membrane forming the cells and supporting the capillary plexus of vessels is thin, transparent, composed of fibres having no resemblance to muscular fibre either of the striped or unstriped kind, unprovided with epithelium, and quite distinct from the membrane lining the bronchial tubes. 4. The *plexuses of the capillary vessels* entering into the minute structure of the lungs are situated immediately beneath the pulmonary membrane forming the air-cells, so that the most delicate structure alone intervenes between the blood in the vessels and the atmospheric air in the cells. Moreover, the capillaries between the cells are aërated on both sides, being inclosed in the fold of membrane forming the sides of contiguous cells.[1] Lastly, each lung is invested by the pleura, a fine serous membrane, which, being reflected from the pulmonary surface over the internal parietes of the chest, forms a shut sac. From the foregoing it may be concluded that the lungs are merely expansions of a delicate membrane, upon the opposite sides of which blood and air are situated; the latter, by its chemical action upon the former, converting the impure venous blood of the pulmonary artery into the pure, arterial, bright red blood of the pulmonary veins.

Position of the Patient.—In the investigation of pulmonary or cardiac affections some care is necessary to place the patient in such a position that the parietes of the chest may be rendered firm and tense without affecting his ease or comfort, and without being inconvenient to the examiner. When the fore part of the chest is to be examined, and the patient is able to sit up, the best position of all will be sitting upon a chair in the middle of the room, opposite to a good light, with the arms hanging loosely down by the sides, the head thrown back, and the upper part of the body uncovered. To examine either lateral region, place the patient's hand of the side to be examined upon the back of his head, and make him lean a little to the opposite side. To percuss or auscultate the back, let him lean well forwards, hold down his head, and fold the arms across his breast.

The chest may also be very carefully explored while the sufferer sits up, or even while lying down in bed, being turned to either side as may be necessary, and as far as his strength will admit. The surrounding bed-curtains and furniture have

[1] See Mr. Rainey's excellent paper on the Minute Structure of the Lungs, in the "Medico-Chirurgical Transactions," vol. xxviii, p. 581.

little or no effect in deadening the sound educed by percussion, although some practitioners have thought otherwise. It is of importance, however, that the room in which the examination is being made should be as quiet as possible, and the examiner should also take care that no part of his own or the patient's dress rubs against the stethoscope.

Regions of the Thorax.—Before proceeding to the consideration of the various methods of physical diagnosis, it is necessary to notice that the surface of the chest has been artificially mapped out into regions, for the purpose of localizing the physical signs as accurately as possible. In dividing the thorax into regions, different observers adopt different boundaries. The plan proposed by Dr. Sibson is certainly the most philosophical; but the following arrangement has the merit of simplicity, and is that most frequently followed:

Regions.	*Sub-Regions.*
a. Anterior.	1. The two clavicular. 2. The two subclavian. 3. The two mammary. 4. The two infra-mammary. 5, 6. The sternal: 5. The upper sternal. 6. The lower sternal.
b. Lateral.	7. The two axillary. 8. The two lateral. 9. The two lower lateral.
c. Posterior.	10. The two acromial. 11. The two scapular. 12. The two inter-scapular. 13. The two dorsal.

The first sub-region—the clavicular—one on each side, corresponds in outline with that portion of the clavicle behind which the apices of the lungs lie, being nearly the inner half of the bone. On percussion the sound should be very clear, the resonance diminishing from the sternal to the acromial end of the clavicle, until it becomes quite dull in the latter part.

The second sub-region—the subclavian—comprises that part of the thorax between the clavicle and upper part of the fourth rib, bounded outside by the deltoid, inside by the edge of the sternum; beneath it lies the upper lobe of the lung, and towards the sternum the main bronchial tube. On the right side also, close to the sternum, lie the superior vena cava, and a portion of the arch of the aorta; while on the left is the edge of the pulmonary artery. The resonance afforded by percussion should be very clear.

A little lower down is the *third or mammary sub-region*, extending from the fourth to the seventh rib on each side, bounded externally by a line drawn vertically about an inch and a half external to the nipple, and internally by the sternum. On the right side the lung lies throughout immediately under the surface, the sound educed by percussion being clear, except at the lower part, where the right wing of the diaphragm and the liver begin to mount; on the left side we find the heart, partly uncovered by lung at the lower part of this region, and consequently there is some degree of dulness.

The *fourth, or infra-mammary sub-region*, is bounded above by the seventh rib, below by the edges of the cartilages of the false ribs, externally by a continuation of the line of the mammary region, and internally by the margin of the lower fourth of the sternum. On the right side the liver—covered at its upper part by the thin margin of the lower lobe of the lung—occupies this region; while on the left is found the stomach, the anterior edge of the spleen, and generally towards its inner part a small portion of the left lobe of the liver. The sound elicited by percussion will be dull, unless the stomach be tympanitic, when it will be preternaturally resonant.

The *fifth and sixth sub-regions, or the upper and lower sternal*, comprise the sternum, and are the only single regions. In the *upper sternal portion*, corresponding to that part of the sternum above the lower border of the third rib, are found the left vena innominata; the ascending portion of the arch of the aorta; the aortic valves—near the lower border of the third left cartilage, and a little higher and just at the left edge of the sternum, the pulmonary; and the trachea with its bifurcation—on the level of the second ribs: the inner edges of the lungs almost unite over these parts down the centre of the region. The sound on percussion should be moderately clear. The respiratory murmur is heard mixed with true bronchial breathing, and there will be resonance of voice. In the *lower sternal portion*, corresponding to the remainder of the sternum, is the right ventricle; and inferiorly a part of the liver, and often of the stomach; the tricuspid and mitral valves lie opposite the upper edge of this region at mid-sternum.

The *eighth sub-region, the axillary*, consists of the axilla, above the fourth rib, on each side. The *ninth, or lateral*, is just below, between the fourth and seventh ribs; while still lower is the *tenth, or lower lateral*. In the first two the percussion-sound is clear; in the last it is dull on the right side, owing to the position of the liver, and often tympanitic on the left over the stomach.

The posterior region includes the *acromial sub-region*, which affords but little information on percussion, the sound being dull; the *scapular sub-region*, corresponding to the middle lobes of the lungs, but which gives a dull sound, owing to the thickness of the bones and their muscles; the *inter-scapular*, occupying the space between the inner edge of the scapula and the spines of the dorsal vertebræ from the second to the sixth, and being resonant on percussion; and lastly, the *thirteenth or dorsal sub-region*, answering to the base of the lung, and giving at its upper part a clear sound; but at its lower, on the right side, a dull one, owing to the position of the liver; and a tympanitic one on the left, owing to the position of the stomach.

Another mode of dividing the chest into regions, with which the reader should be acquainted, has been proposed by Dr. Sibson, who defines the outlines of the regions by the anatomical boundaries of the subjacent organs. These regions consist of:

The simple.	The right pulmonic. The left pulmonic. The cardiac.
The compound.	The pulmo-hepatic. The pulmo-gastric. The right pulmo-cardiac. The left pulmo-cardiac. The pulmo-vasal.

Of the simple regions, *the right pulmonic* is bounded above by the apex of the right lung; below by an imaginary line drawn through the right convexity of the diaphragm or the fifth intercostal space in front, and the articulation of the eighth rib behind; and internally, by a line drawn down the centre of the sternum. *The left pulmonic* has the apex of the left lung above; an imaginary line resting upon the left convexity of the diaphragm—which is an inch lower than on the right side, below; and internally the imaginary line drawn down the centre of the sternum, except between the lower margin of the fourth and the upper part of the seventh ribs, where the lungs form a curve externally, leaving the pericardium uncovered. *The cardiac region* corresponds to the heart.

Of the compound regions, *the pulmo-hepatic* is over that layer of lung which caps the upper portion of the liver on the right side; *the pulmo-gastric*, over that covering a part of the liver, stomach, and spleen; *the pulmo-cardiac*—right and left—corresponds to the portions of the lungs overlapping the

right and left side of the heart; while *the pulmo-vasal* corresponds to the layer of lung between the sternum and great vessels, extending upwards along the sternum from the third sterno-costal articulations.

Description of the Method of Physical Diagnosis.—The various means by which the physical signs of pulmonary and cardiac affections are elicited, are termed methods of physical diagnosis, and these methods consist of:

1. Inspection.
2. Palpation, or the application of the hand.
3. Mensuration.
4. Succussion.
5. Spirometry.
6. Percussion.
7. Auscultation.

The general mode of practising these methods, and the signs to be deduced from the examination, have now to be described and considered.

1. INSPECTION.

By inspection or ocular examination of the external surface of the chest, we learn the general form of the framework, the shape of the sternum and rib cartilages, the size of the cavity, and the movements of its walls. The patient should be placed in an easy, comfortable position; sitting, if possible, opposite a good light, and with the surface of the chest exposed. Inspection should be practised anteriorly, posteriorly, and laterally, and the action of the two sides of the chest should be closely compared; since pulmonary diseases are in the majority of cases limited to one side, and impede proportionally the costal movements of one-half of the chest only.

Form.—Regularly formed chests, presenting to the eye a cone, having its narrow end uppermost, its two sides symmetrical, and its transverse diameter exceeding the antero-posterior, are much more rarely found than is commonly supposed, certain marked deviations of form, which are quite compatible with a perfect state of local and general health, being very common. M. Woillez, who has paid much attention to this matter, states indeed that the regularly formed chest exists in scarcely more than twenty per cent. of adult males taken indiscriminately; and he has divided the irregularities or heteromorphisms—ἕτερος, other, and μορφή, form—which render

the chest non-symmetrical into two classes: the *physiological*—or those compatible with health, and which are due to natural conformation, or to peculiarity of occupation; and the *pathological*—or those resulting from disease.[1] It need hardly be mentioned that the practitioner must be on his guard not to confound the natural alterations of shape, with those dependent upon disease; an error which he can scarcely commit, provided attention be paid to all the circumstances of the case. Undue prominence of one side of the chest, or bulging of part of one side, is best seen in cases of abundant pleuritic effusion, in pneumothorax, hydrothorax, effusion of blood into the pleuræ, effusion of fluid into the pericardium, and general vesicular emphysema; less distinctly in hypertrophy of the lung, and during the growth of intra-thoracic tumors. In cases of pleurisy with abundant effusion, the diseased side often measures an inch or even two inches more than the other; the ribs and cartilages assume the position which they present during a deep inspiration; the intercostal spaces are pushed outwards, and in them fluctuation may occasionally be distinguished. In pericardial effusion, and in hypertrophy of the heart, the bulging will be found in the mammary and lower sternal regions; while in aneurism of the aorta it will be noticed in the upper and central parts of the chest.

Retraction—a sinking of the framework of the chest on one side, and depression—a sinking of only one spot or sub-region, are the opposite states to undue prominence and bulging. Retraction cannot be present without reduction in size of the lung, which may be produced either by extrinsic pressure or by changes in its own substance. Now, retraction is one of the most common results of pleurisy, when the effused fluid has been partially or entirely absorbed; for the lung having been compressed against the vertebral column, deprived of its elasticity, and frequently bound down by the formation of false membranes, is prevented from re-expanding and resuming its original volume as the fluid is removed; so that in order to obviate that void which would otherwise exist between the ribs and the lung, the former sink in and approach the latter. The retraction will also appear the greater from the sound lung becoming hypertrophied, owing to its having to perform double work. The lung is reduced in volume, so as to cause retraction and depression in tubercular disease, in pneumonia during the stage of resolution, and in cases where its functions are interfered with by the pressure of tumors, or

[1] Recherches Pratique sur l'Inspection et la Mensuration de la Poitrine.

aneurisms, or enlarged glands. In healthy persons, the heart's impulse is generally visible only at the apex, which beats in the space between the left fifth and sixth ribs, about midway between the nipple and left border of the sternum. In cases of pericardial effusion, or of hypertrophy of the heart, the cardiac region becomes arched forwards, the intercostal spaces widen and the left border of the sternum is pushed more or less forwards; the apex-beat of the heart is also raised in the case of pericardial effusion, while in hypertrophy it is depressed, sometimes being carried as low as the space between the seventh and eighth ribs, or even slightly lower. If both sides of the heart be equally hypertrophied, the apex point will be displaced to the left; if the left cavities alone, to the left—even to as great an extent as three or four inches from its natural spot; while if the right cavities suffer mainly, the impulse will be to the right—towards or even beneath the sternum.

Size.—The variations in size between the two sides of the thorax, occurring in consequence of disease, are more readily appreciated by measurement than by inspection, and hence will be treated of in the section on Mensuration. It may be now mentioned, however, that in most persons the right side of the chest is naturally rather larger than the left.

Movements.—The motions of the chest-walls may be increased or diminished. In spasmodic asthma the movements of both sides of the chest are much increased during the attack, and such also is the case in many instances of croup, laryngitis, and similar affections. There is a want of due expansion of the affected side in paralysis, and in great debility of the respiratory muscles; in pleurodynia, the early stage of pleurisy, and rheumatism or neuralgia of the intercostal muscles, when each movement causes acute pain; in obstruction to the functions of the lung from disease—as in advanced phthisis, in pulmonory consolidation from pneumonia or other causes, in pneumothorax, hydrothorax, and obstruction of the main bronchial tube; and, lastly, in disease of the heart, in aneurismal tumors, and in enlargement of the liver, impeding respiration on the right side.

2. PALPATION, OR THE APPLICATION OF THE HAND.

Palpation is employed in two ways:—1. When the phenomena of the disease are limited to a small extent, by pressure with the tips of the fingers, as in the ordinary exercise of the sense of touch; and, 2, by placing the palms of the hands

upon both sides of the chest, gently and evenly, and with such a moderate degree of pressure as to enable them to participate in—but not to deaden—the vibrations, or to appreciate the excess or defect of motion in the two sides, and thus to compare the results.

Palpation—below the clavicles in the female, and below the epigastrium in the male—is the best mode of learning the number and force of the respirations.

Vocal Vibration, or Fremitus.—On applying the hand to the chest of a healthy individual while he is speaking, a slight thrilling sensation will be communicated to the fingers, more marked in adults than in children, in males than females, in short-chested than long-chested persons, and in the spare and thin than in the stout: it is also most distinct over the larynx and trachea, and generally better appreciated on the right side than the left. The act of coughing produces a similar but less marked vibration. The natural vocal fremitus or thrill may be increased or diminished by disease. It is *augmented* when the density of the pulmonary structure is increased—unless the increase be very great—as in congestion of the lung, in the early stages of pneumonia, in tubercular infiltration, and in œdema of the lung: it is *diminished* or *annulled* when the lung becomes solid from any cause, in the stage of pneumonic hepatization, and in instances of pleuritic effusion.

Pulmonary Friction-fremitus.—The gliding motion of the costal upon the pulmonary pleura gives rise to no vibration in health; but in many cases of pleurisy, when their surfaces become roughened, a distinct cracking sensation or rubbing movement—friction-fremitus—is conveyed to the hands. Dr. Walshe states that he has met with this phenomenon to a higher degree at the absorption-period than at the outset of pleurisy.

Fluctuation.—Palpation will sometimes detect the presence of fluids contained in the lungs or pleuræ, the sensation communicated being that of ordinary fluctuation, with a certain amount of vibratile tremor.

The Heart's Impulse.—Synchronous with the systole of the ventricles and the first sound of the heart an impulsive movement is felt, depending on the shock of the apex against the side; the force of the impulse being, to a certain extent, proportionate to the healthy condition of the muscular fibres of the heart's walls. There is no sign of hypertrophy of the heart so sure as that afforded by great increase of its impulse.

The inordinate action of the heart in anæmia and in valvular diseases, as well as the extent and degree of aneurismal pulsations, will be ascertained by palpation.

Fremissement Cataire.—Of all the irregular vibrations of the thoracic walls, the most important is the valvular thrill, or purring-tremor, or *frémissement cataire* of Laennec, resembling—it is said—the sensation afforded by stroking the back of a purring cat. This phenomenon is always accompanied by a bellows-murmur, and occurs in those conditions of the heart—organic or inorganic—which yield this murmur with the greatest intensity; thus it is very distinct in mitral regurgitant disease, in constrictive aortic disease, and in chlorosis—in the latter case proving a good index of the condition of the blood, since it becomes less distinct as the quality of the vital fluid improves.

Cardiac Friction-fremitus.—In inflammation of the pericardium a friction-fremitus may sometimes, though rarely, be felt. When discovered, it will always be found to be of short duration and general movable.

3. MENSURATION.

In applying mensuration a common tape measure is often sufficient, though the double tapes, as suggested by Dr. Hare, may be advantageously used, or—where great exactness is necessary—Dr. Sibson's chest-measure or Dr. Quain's stethometer (see Chapter II, Section 4), may be found necessary. The object of measuring the chest is to ascertain more exactly than can be done by inspection and palpation the comparative bulk and volume of the two sides, as well as the amount of expansion and retraction of the chest-walls during inspiration and expiration.

The circular width of the chest—taken opposite the ensiform cartilage—varies considerably in healthy individuals; it increases gradually with age, from sixteen to sixty, and is greatest in persons whose occupations demand active exertions of the whole frame; probably thirty-three inches may be regarded as the fairest adult average. The two sides of the chest are of unequal semi-circumference in the great majority of healthy adults, the right side measuring about half an inch more than the left; in left-handed people, the two sides are generally equal.

The diseases which cause enlargement of the affected side of the chest are pleurisy with effusion, pneumothorax, hydro-

thorax, emphysema, hypertrophy of the lung, and cancerous tumors of the lung or pleura; while the converse obtains in pleurisy at the period of absorption with retraction, pleuropneumonia, tubercular deposit in the second stage, chronic consolidation of the lung, and infiltrated cancer of the lung.

From a large number of observations made by Dr. Sibson, with his "chest-measurer," he has established the following propositions concerning the respiratory movements in health. Thus, in the healthy robust male the forward movement of the sternum and of the ribs—from the first to the seventh—ranges from one-fiftieth to one-fourteenth of an inch during an ordinary inspiration; and from half an inch or nearly two-thirds of an inch to two inches—the amount varying with the extreme breathing capacity—during a deep inspiration. Of the five lower ribs the ordinary movement is less, and the forced movement greater, than of the upper seven. The ordinary abdominal movement is from a quarter to one-third of an inch; the extreme from about half an inch to an inch and a half. The ordinary lateral expansion of the five lower ribs is greater, and the extreme expansion is usually less, than the respective ordinary and extreme expansion of the seven upper ribs. The expansion of the second ribs is usually alike on both sides; below these, all the inspiratory movements, especially those over the heart, are usually somewhat less on the left side than on the right, both during ordinary and extreme inspiration. In the healthy boy, owing to the greater flexibility of the costal cartilages, the motion of the sternum is less than that of the ribs, but the extreme movement of the seven superior ribs is greater in proportion to the breathing capacity than it is in the adult; the upper portion of the sternum advances more than the lower end during a deep inspiration, but there is little decided difference during tranquil respiration. In the old man, owing to the consolidation of the cartilages, the motion of the sternum during inspiration is usually greater than that of the ribs, and the lower end of this bone usually advances more than the upper. In females the expansion of the seven superior ribs is exaggerated, and that of the diaphragm and lower ribs restrained, owing—in a great measure—to the use of tight stays. The restrained movement of the lower ribs during a deep inspiration is much greater when the stays are on than when they are off.

In those cases of disease in which there is great obstruction to the entrance of air through the outer air-passages during inspiration, as in cases of extreme narrowing of the larynx or

trachea, or obstruction of a large bronchus, the walls of the chest actually fall backwards, to a greater or less extent, in proportion to the obstruction, instead of advancing during inspiration. The explanation of this phenomenon given by Dr. Sibson, is, that the diaphragm acts with great power and lengthens the lung, and as air can only rush into the lengthened lung with great difficulty through the larynx, the lungs collapse, just as a half-filled bladder collapses when it is lengthened, and the presence of the atmosphere forces backwards the anterior walls of the chest.

In emphysema and bronchitis, in those cases where there is an obstruction to the entrance of air into the air-cells through the smaller air-tubes, the lower end of the sternum and the adjoining cartilages fall backwards during inspiration, while the upper part of the chest expands, and the diaphragm descends with great power. In pleurisy with effusion, the inspiratory expansion of the whole of the affected side of the chest is diminished, or in some cases even reversed; while that of the opposite side is throughout exaggerated: the inspiratory motion of the abdomen is also lessened or abolished on the affected side, while on the opposite side it is increased. When the whole of the lung is consolidated, from gray hepatization or tubercular deposit, or condensed, from firm membranous bands following pleurisy, then the expansion of the whole of the affected side is diminished, arrested, or reversed, while that of the healthy side is exaggerated. So, also, when the upper lobe of the lung is affected with phthisis, pneumonia, or any local disease, or when the five superior ribs are injured, or when the intercostal muscles moving them are inflamed or affected with pleurodynia, or when the motion of these ribs produces pain in the arm or shoulder-joint, then the inspiratory motion of the five superior affected ribs is diminished, while that of the ribs of the opposite side is usually increased. When the lower lobe of the lung is the seat of pneumonia or any other disease, the motion of the ribs over that lobe is usually, but not always, diminished; and the motion of the abdomen just below the ribs, on the affected side, is always lessened.

When the heart is enlarged, and still more when the two surfaces of the pericardium are adherent, there is diminished motion of all the ribs on the left side, with the exception usually of the second and third. If there be pericarditis, the motion is still more interfered with, and the motion of the abdomen just below the xiphoid cartilage is also much affected, being in all cases lessened, and in extreme examples

quite interrupted; the motion of the abdominal walls on either side is usually not affected.

In peritonitis, if the disease be general, the abdominal motion is universally diminished; if it be partial, the diminution of the respiratory motion is most marked over the immediate seat of the inflammation.[1]

From the foregoing, it is apparent that the modifications of the respiratory movements in disease are of great value in aiding diagnosis, since although the nature of disease is not indicated by them, yet its seat is at once pointed out. In the majority of cases, the indications afforded by the senses of touch and vision will be sufficient; but in obscure examples of pulmonary disease, the observations will be rendered more minute and accurate by the aid of the chest measurer.

4. SUCCUSSION.

Succussion is performed by gently but abruptly pushing the patient's trunk backwards and forwards, or, by the patient himself making the same movement, while the observer's ear is applied to the walls of the thorax. It is employed to detect the sound of thoracic fluctuation, produced by the violent collision of air and liquid in a cavity of somewhat large dimensions, and compared by Dr. Walshe to the splashing of water in a party-filled decanter held close to the ear; the precise tone, however, will vary with the density of the fluid, and the proportion of fluid and air present. The sound of thoracic fluctuation may also be accompanied with metallic tinkling. It is elicited in cases of pneumo-hydrothorax, with pulmonary fistula; or, very rarely, in pneumo-hydrothorax, when no fistulous communication exists between the lung and pleura; and in phthisis, when the tubercular cavity is large and partly filled with fluid.

5. SPIROMETRY.

The spirometer is an instrument for measuring the volume of air expired from the lungs, the construction of which, as well as the way in which it is to be used, is fully explained in Chapter II, Section 3.

The extent of the movements performed by the thoracic

[1] Dr. Sibson: On the Movements of Respiration in Disease. Medico-Chirurgical Trans. Vol. xxxi, p. 376; and Prov. Med. and Surg. Journal, 5th Sept. 1849.

boundaries for the purpose of respiration, admits of three degrees of modification:

a. Extreme expansion (inspiration).
b. Extreme contraction (expiration).
c. Intermediate condition (ordinary breathing).

The first two movements displace a larger, and the third movement a smaller volume of air. The spirometer measures collectively these three volumes of air; that is to say, the most complete voluntary expiration immediately following the most complete inspiration, which Dr. Hutchinson denominates the "vital capacity," or the "vital volume."[1] The vital capacity volume is the limit of all the requirements for air which man can require; the ordinary breathing is a quiet, gentle, and more limited movement. The ordinary breathing movement may be considered, then, to have "a spare margin which is ever at command—a margin absolutely necessary to health. When we cannot command this margin, i. e., extend the ordinary breathing movement into the extraordinary breathing movement, the body is incommoded, and our well-being suffers relative to the degree of change in the thoracic mobility." The spirometer not only measures this margin together with the ordinary breathing movement, but it also determines the permeability of the lungs to air. Dr. Hutchinson chose to found his observations upon the vital capacity volume rather than upon the ordinary breathing volume, because the former is from twelve to twenty times greater than the latter, and an error in a few cubic inches in the larger volume is of little consequence; while an error of a few cubic inches in the ordinary breathing volume is of such importance as to disguise the correct measurement of the natural breathing volume, and is sure to occur from the nervousness or stupidity of the person examined.

The vital capacity volume is affected by height, by attitude, by weight, by age, and by disease.

The Vital Capacity as affected by Height.—From a very large number of experiments, Dr. Hutchinson has deduced the curious fact that the height of an individual is the chief condition which regulates his vital capacity, and he lays down the following rule: That in the erect position, for every inch of stature from five feet to six feet, eight additional cubic inches of air, at 60° Fahr., are given out in one volume, by the deepest expiration, immediately following the deepest inspiration. This table is intended to show the capacity in health and in the three stages of phthisis.

[1] Medico-Chirurgical Transactions, vol. xxix, p. 138.

Height.				Capacity in Health.	Capacity in Phthisis pulmonalis.		
Ft.	in.	Ft.	in.	Cub. in.	1st Stage. Cub. in.	2d Stage. Cub. in.	3d Stage Cub. in.
5	0	to 5	1	174	117	99	82
5	1	to 5	2	182	122	102	86
5	2	to 5	3	190	127	108	89
5	3	to 5	4	198	133	113	93
5	4	to 5	5	206	138	117	97
5	5	to 5	6	214	143	122	100
5	6	to 5	7	222	149	127	104
5	7	to 5	8	230	154	131	108
5	8	to 5	9	238	159	136	112
5	9	to 5	10	246	165	140	116
5	10	to 5	11	254	170	145	119
5	11	to 6	0	262	176	149	123

This reads thus: A man between 5 ft. 7 in. and 5 ft. 8 in. in height, should be able to breathe, in health, 230 cubic inches; in the first stage of consumption this will be reduced to 154; in the second to 131; and in the third to 108 cubic inches.

Weight as affecting the Vital Capacity.—In examining diseases of the lungs, the indications afforded by the weight of the individual are invaluable. One of the first signs of disease, generally, is loss of weight; a steady loss always precedes consumption, and is the earliest symptom of tubercular disease. Dr. Hutchinson has observed, that a slow and gradual loss is more serious than a rapid and irregular diminution. A person may lose weight, but he cannot do this gradually without some severe exciting cause.

Weight in excess begins mechanically to diminish the breathing movements when it has increased to 7 per cent. beyond the mean weight; and from this point the vital capacity decreases 1 cubic inch per lb. for the next thirty-five lbs. The ordinary weight increases with the height, probably about 6½ lbs. per inch of stature. It is unnecessary, however, to make the correction for weight, unless it be much in excess. From an examination of 2650 healthy men at the middle period of life, Dr. Hutchinson has deduced the following table:

This table reads:—A man 5 ft. 8 in. should weigh 11 st. 1 lb., or 155 lbs. (14 lbs. = 1 stone); he may exceed this by 7 per cent., and so attain 11 st. 12 lbs., or 166 lbs., without affecting his vital capacity; beyond this weight his respiration becomes diminished.

Exact Stature.		Mean Weight.			Weight increased by 7 per cent.		
Ft.	in.	St.	lbs.	lbs.	St.	lbs.	lbs.
5	1	8	8	or 120	9	2	or 128
5	2	9	0	" 126	9	9	" 135
5	3	9	7	" 133	10	2	" 142
5	4	9	13	" 139	10	9	" 149
5	5	10	2	" 142	10	12	" 152
5	6	10	5	" 145	11	1	" 155
5	7	10	8	" 148	11	4	" 158
5	8	11	1	" 155	11	12	" 166
5	9	11	8	" 162	12	5	" 173
5	10	12	1	" 169	12	13	" 181
5	11	12	6	" 174	13	4	" 186
6	0	12	10	" 178	13	8	" 190

Age as affecting the Vital Capacity.—The vital capacity is found to be at a maximum between the ages of thirty and thirty-five, though the effect of age is not very manifest until a person has attained fifty-five years, when the capacity diminishes sufficiently to render it necessary to make a subtraction. This we must do according to the annexed table:

Height.				Mean.		Minimum.	
Ft.	in.	Ft.	in.	Age, 15 to 55.	Age, 55 to 65.	Age, 65 to 75.	16 per cent. below mean.
5	0	to 5	1	174	163	161	146
5	1	to 5	2	182	173	168	153
5	2	to 5	3	190	181	175	160
5	3	to 5	4	198	188	182	166
5	4	to 5	5	206	196	190	173
5	5	to 5	6	214	203	197	180
5	6	to 5	7	222	211	204	187
5	7	to 5	8	230	219	212	193
5	8	to 5	9	238	226	219	200
5	9	to 5	10	246	234	226	207
5	10	to 5	11	254	242	234	213
5	11	to 6	0	262	249	241	220

Thus it appesrs that a man of 5 ft. 8 in., of the mean weight, may be expected to breathe 230 cubic inches until the age of fifty-five, 219 cubic inches from fifty-five to sixty-five, and 212 from sixty-five to seventy-five years of age.

In all the foregoing calculations, it is supposed that the patients are dressed in ordinary attire. We therefore have to make no allowance for boot-heels, weight of dress, &c. It may be remarked, however, that M. Quetelet estimates the average

weight of the clothes, at different ages, as one-eighteenth of the total weight of the male body, and one-twenty-fourth of the total weight of the female.

6. PERCUSSION.

For the invention of the method of percussion—so to speak—we are indebted to Avenbrugger, who published at Vienna, in 1761, his "Inventum novum, ex percussione thoracis humani, ut signo, abstrusos interni pectoris morbos detegendi," a treatise which remained unread until Corvisart translated it and brought it into general notice.

Percussion—the act of striking the parietes of the cavities of the body in such a manner as to enable the examiner to judge of the density of the subjacent parts—is one of the most important means of physical diagnosis in diseases of the chest. It is said to be *immediate* or *direct* when nothing intervenes between the percussing agent and the part percussed; *mediate* when some solid substance—as the finger or a plate of ivory—is placed upon the part to be explored, and the blow made upon such substance. In the present day mediate percussion is generally employed; the four fingers of the left hand, pressed firmly against the chest, serving as a *pleximeter*, while the ends of those of the right hand, brought together into a line, form the *plessor* or *percussor*. Immediate percussion may be performed by striking the chest with the palmar surface of the fingers. In practising percussion, it is best to strike first on one side of the chest and then on the corresponding spot of the other side, in order to compare the results; since our estimate of the presence or amount of disease is determined more by the relative degree of dulness or resonance on the opposite sides, than by any absolute degree of dulness; in doubtful cases the observation should be repeated many times, and in various postures. The strokes also should be made quickly, smartly, and uniformly, and at right angles to the part percussed; and the hand should be moved from the wrist alone, the forearm and arm being held motionless, as the strokes will be better regulated, and fall more uniformly on the parts struck.

In percussion, if the chest be struck over a portion of healthy lung, a hollow or clear sound will be produced; if over a portion of lung which has lost its spongy character and is void of air, or in any way solidified, either by pressure from without—as in pleuritic effusion, or by deposit within—as in pneumonia or pulmonary apoplexy, then only a dull,

heavy, or dead sound will be heard: so also when that part of the parietes covering the heart—the lower sternal region and that portion of the left mammary which is covered by the cartilages of the fifth, sixth, and seventh ribs—is similarly struck, the resulting sound will be dull; and if the heart be enlarged, or its investing membrane filled with fluid or its chief vessels enlarged by aneurism, the extent of dulness will be increased in proportion to the extent of the disease. The lungs yield their normal, full, clear sound, slightly more and more distinctly from above downwards, owing to their increasing capacity; the sound being muffled, however, by the pectoral muscles, the mammæ, and the scapulæ. On the right side, from the sixth rib, a dead sound is produced from the presence of the liver; the same is elicited on the left, from the junction of the fourth costal cartilage with the left border of the sternum to the point where the heart's impulse is felt, owing to the position of the heart; while below on this side, to the left, at the sixth rib, the sound will be tympanitic, owing to the stomach being subjacent.

The morbid states discovered by percussion are few in number and simple in nature, but the indications they furnish are valuable.

Diminution of Clearness.—Whenever the density of the materials underneath the part struck is increased, there will be diminution of clearness—varying from a slight degree to perfect dulness, in proportion to the increased density—with shortening in the duration of the sound. Slight pleuritic effusion, congestion and partial condensation of the lungs, and spasmodic asthma during the paroxysm, are the chief causes of a partially dull sound on percussion; while in pleurisy with great effusion, in hydrothorax, in pulmonary apoplexy, in complete condensation of the lung from pneumonia, in phthisis, in cancer of the lung or pleura, in hypertrophy with dilatation of the heart, in pericarditis with effusion, and over aneurismal tumors, there will be an absence of any reasonant sound on percussion, or, in other words, perfect dulness.

Increase of Clearness.—Increased clearness and duration of sound, with excess of elasticity, is noted, where the relative quantity of air within the chest is increased, but not carried to such extremes as to interfere, by tension of the walls, with their vibration, as—for example—in pneumothorax, and at the upper part of the chest in hydro-pneumothorax, and in atrophy, hypertrophy, and emphysema of the lung. Dr. Stokes

has suggested that extreme anæmia, by lessening the relative quantity of blood in the lung, may increase the clearness of the percussion-sound. Increase of clearness and a duration of sound, with diminished elasticity, is observed where there is a surplus of air in the subjacent part, with considerable induration of tissue between the surface and the part containing that surplus,—a combination of conditions sometimes met with in phthisis, when a superficial cavity in the lung has a thin, indurated, and adherent external wall.[1]

Tympanitic Sound.—This sound resembles the tone obtained from a drum, and is produced on percussing the stomach, or a portion of intestine filled with air, but never on percussing the healthy chest. When therefore it occurs, we may infer that a cavity filled with air exists beneath the spot percussed; and consequently in thoracic affections we obtain the clearest tympanitic sound in pneumothorax. It may also, however, be produced less perfectly in two conditions of the lung, independently of pneumothorax, viz.: 1, in the emphysematous portions of lung which often surround lung-tissue solidified from hepatization, tubercles, &c.; and, 2, according to Skoda, when the lung is gradually recovering from the compression of fluid previously effused into the pleural sac.

Amphoric Resonance and Metallic Tinkling.—Amphoric resonance—a modification of the tympanitic tone—is similar to that occasioned by striking a wine-cask partially or entirely empty. Cavities, larger than are required for the production of the tympanitic sound, and in which air can vibrate, are essential to the production of this tone. The only diseases in which it is heard are pneumothorax, and in tubercular cavities of large size, having walls equably and generally condensed. When the cavities contain a small quantity of fluid, metallic tinkling will be frequently audible, from drops of the fluid falling from the upper part of the cavity into the liquid below.

Tubular Sound.—The tubular percussion-sound, elicited from an elastic tube, filled with air, is natural only when produced over the larynx or trachea. It is heard, however, when any condition exists which brings the larger bronchial tubes unnaturally near the surface, or when any solid, sound-conducting substance is present between the bronchi and the surface. Thus it will be elicited in dilatation of the bronchi, in chronic consolidation of the lung, in some cases of pleu-

[1] See Dr. Walshe, op. cit. p. 71.

ritic effusion, very rarely in pneumonia, in small tubercular cavities, and in cases where a cancerous mass exists around the bronchial tubes.

The Bruit de Pot Fele.—The cracked-metal sound, resembling, according to Laennec, the sound given by a cracked pot when struck, or rather that elicited by the child's trick of striking the knee with closed hands to convey the idea that they contain money, is generated in the lungs when a large cavity exists under the part struck, having thin elastic walls, and a free communication with the bronchial tubes. It seems to be produced by the sudden forcible ejection of air and fluid along the tubes communicating with the excavation. According to Dr. Stokes, it may sometimes be elicited in cases of bronchitis where the secretion is thin and has gravitated to the lower parts of the lungs.

7. AUSCULTATION.

The genius, enthusiasm, perseverance, and energy of the author of the imperishable treatise, "De l'Auscultation Médiate, ou Traité du Diagnostic des Maladies des Poumons et du Cœur," have been so frequently discoursed upon, that it may almost appear a work of supererogation again to dilate upon that discovery by which Laennec forever holds mankind his debtor. As the Highlander, however, will not pass the cairn of his former benefactor or friend without adding a pebble to the tumulus, in grateful remembrance of favors received, so it is impossible for any author to enter upon the consideration of the subject of auscultation without his thoughts reverting to those days when, at the Parisian Hospital Necker, Laenuec commenced that series of observations which enabled him, as he tells us, "to deduce a set of new signs of diseases of the chest, for the most part certain, simple, and prominent, and calculated, perhaps, to render the diagnosis of the diseases of the lungs, heart, and pleura as decided and circumstantial as the indications furnished to the surgeon by the introduction of the finger or sound in the complaints wherein these are used." But although we are now, one and all, only too happy to recognize the truth of this prediction, yet it was not so when it was penned in the years 1818 and 1819. How the facts brought forward were disputed, the infereuces denied, and the stethoscope laughed at, are circumstances only too well known; and there can be but little doubt that had the work from which I have quoted

been written in a manner less excellent, or had the results drawn from repeated observations been less conclusive, Laennec would have shared the same fate as Avenbrugger, and auscultation—like percussion—might have waited for a Corvisart to introduce it to general notice.

It must not be imagined, however, that Laennec removed all the impediments or solved all the difficulties that surrounded the idol he set up. His death, in 1826, in the forty-fifth year of his age, prevented his doing much more than clear the way, and indicate the right path for research. Much remained to be done, and even now there is still much to accomplish. Happily there are men in this country, in Germany, and in France, whose chief desire appears to be to remove the existing obstacles.

Auscultation—*auscultо*, to listen—signifies the investigation of internal diseases by the sense of hearing. It may be *immediate*, when the ear is placed in opposition with the surface of the body, or *mediate*, when some conductor of sound, as a stethoscope, is placed between the ear of the auscultator and the person of the patient. Immediate auscultation may be employed with the best success in some cases; the patient's chest should generally be covered with a soft towel or handkerchief, smoothly spread, and tightly drawn over the surface, and the examiner should take care that none of his hair intervenes between his ear and the chest of the examined, or sounds may be produced which will be readily mistaken for those proceeding from within. In the greater number of instances, however, mediate auscultation is to be preferred, a common hollow cedar-wood stethoscope being used as a conductor between the parietes of the chest and the ear. In employing this instrument it should be applied to the naked skin firmly, and held steady, just above the trumpet-shaped extremity, by the thumb, index, and second fingers; all friction between it and the clothes should be guarded against; both sides of the chest should be thoroughly explored; and the posture of the observer should be free from constraint.

AUSCULTATION OF THE RESPIRATION.

On applying the ear to the healthy thorax, the air will be heard entering and filling the lungs, and then leaving them, in perpetual succession. The sound caused by the ingress and egress of air, or, in other words, by inspiration and expiration, has been termed *the respiratory murmur;* it is caused

by the vibration of the tubes through which the air rushes, according to well-known acoustic principles, and it varies in character according to the age of the subject, the sex—being louder in females than males,—and the part of the chest where it is heard, being spoken of as pulmonary or vesicular, bronchial, and laryngeal.

Pulmonary or Vesicular Respiration is heard all over the chest in health, except at those parts where it is superseded by bronchial or laryngeal breathing. The murmur is a sound of a gentle, soft, breezy character, heard with the movements of inspiration and expiration, but much more intensely with the former than the latter; though in healthy respiration the inspiratory and expiratory murmurs follow each other so closely, that they may almost be said to be continuous. The vesicular murmur is much louder during childhood than in after life, just as the whole process of respiration is then more active; hence a loud vesicular murmur is said to be *puerile*. Now although puerile respiration is a sign of health during the early periods of life, yet at other times it is not so, being indicative either of temporary excitement or of the presence of disease in some part of the lungs. Thus when one lung is rendered powerless, from the compression of fluid effused by an inflamed pleura, or when a portion only of a lung becomes solidified, as in pneumonic hepatization, the intensity of the respiratory murmur will be increased in the healthy lung or in the unaffected parts of the diseased lung, owing to the necessarily increased functional activity of the same, the compensating powers of the healthy lung-texture being brought into play.

In place, however, of the respiratory murmur being increased, it may become diminished or suppressed, as will occur when, from any cause, air is prevented from freely entering the lungs. Thus it will be diminished in obstructive diseases of the larynx, trachea, or bronchi, in bronchitis, in partial infiltration of the lung with tubercle, in pneumonia, in pleurisy with limited effusion, and in some cases of pleurodynia or even of old age, where there is feeble respiration from diminished action. So also it may be perfectly suppressed in complete obstruction of a bronchus, in pleurisy with abundant effusion, in pulmonary apoplexy, in spasmodic asthma during an intense paroxysm, and, very rarely, in infiltration of the lung with tubercle or other morbid matters.

Bronchial Respiration is audible over the situation of the large bronchial tubes, i. e. at the upper portion of the sternum, between the scapulæ on a level with their spines, and less

clearly under the clavicles and in the axillæ. It is generally mixed with the vesicular murmur in health, than which it is harsher, more tubular, and blowing.

This phenomenon is heard, however, in certain morbid conditions, over parts naturally yielding the vesicular murmur, which it supplants; it then indicates condensation of the lung from effusion into its air-cells and parenchyma, as occurs in the second stage of pneumonia pulmonary œdema, pulmonary apoplexy, malignant or tubercular deposits, intra-thoracic tumors, &c. It is clear that the lung so condensed becomes a better conductor of sound than a healthy lung, and hence conducts the bronchial murmur to the ear of the auscultator; the murmur being loud in proportion to the extent and degree of condensation, and the proximity of the condensed portion to the larger bronchi.

Much discussion has lately taken place as to the view of Professor Skoda, who explains the existence of abnormal bronchial respiration by the laws of consonance; but although it may be useful for us to know the physical causes which produce auscultatory phenomena, yet in a work like the present I deem it better to explain the diseased conditions on which they depend.

The Laryngeal Murmur is heard normally over the larynx and trachea, and is more intense, drier, hollower in quality than the preceding; in fact, it conveys the idea of air rushing through a tube of large calibre. When heard in situations where vesicular respiration alone exists in health, it is indicative of a cavity communicating with the bronchi, and is then called *cavernous* respiration; while if it assumes an *amphoric* character it is diagnostic of pneumothorax with pulmonary fistula.

Sounds caused by Morbid Secretion.—The sounds or murmurs which have just been treated of are all to be heard in the lungs during health, being merely modified by disease; those, however, which remain to be considered, viz., the secretion-sounds and the rubbing or friction sound, are entirely adventitious phenomena. The sounds caused by morbid secretion are as follows:

Dry Sounds	Sibilus, in small tubes. Rhonchus, in large tubes. Dry crackle,—crude tubercle.
Moist Sounds	Small crepitation,—pneumonia. Large crepitation,—bronchitis—cavernous gurgle. Humid crackle,—softened tubercles.

Sibilus is a hissing or wheezing noise, and occurs when the inflammation in catarrh or bronchitis has reached the small bronchi and vesicles, and has diminished their natural calibre, by rendering the membrane lining them tumid; it is a sound bespeaking some danger.

Rhonchus is a snoring or droning hum, like the cooing of a pigeon or the bass note of a violin. It belongs to the larger division of the bronchial tubes, and denotes their partial narrowing; it is of much less importance than sibilus, and usually implies no danger. It may exist alone, as in bronchitis, or should the inflammation proceed, it will be conjoined with sibilus.

Dry crackle, the *craquement* of Laennec, resembles the sound produced by blowing into a dried bladder or crumpling up in the hand very fine tissue-paper, and conveys the impression of air distending lungs that have become more or less dry, and whose cells have been unequally but much dilated. It is only heard during imspiration in parts of the lung where crude unsoftened tubercle has been deposited in moderate quantity.

Crepitation is a moist sound, of two varieties, according to the size of the tubes in which it is generated: there is no difference between the two kinds, except in degree, and they generally merge insensibly into each other. In common bronchitis, for example, after a certain time, the inflamed membrane ceases to be dry, and begins to pour out a stringy tenacious fluid; rhonchus and sibilus then cease to be heard, their place being taken by crepitations—sounds resulting from the passage of air through a liquid, and directly occasioned by the formation and bursting, in quick succession, of numerous little air-bubbles. *Large crepitation* is readily detected, as the air-bubbles are large; it takes place in the larger air-tubes, and is indicative of the presence of serum, mucus, pus, or blood in the large bronchial tubes. *Small or fine crepitation*—a good idea of this sound may be obtained from rubbing between the finger and thumb a lock of one's own hair, close to the ear—occurs in the very smallest ramifications of the bronchi and the air-vesicles themselves; it supersedes the vesicular breathing, and indicates the presence of a small quantity of fluid in the air-cells, a condition which may arise not only from inflammation of the lung, but from œdema, or from an effusion of blood into the vesicles—as in pulmonary apoplexy. In the greater number of cases, however, it is a pretty certain sign of the existence of pneumonia; it may be heard from an early stage of the inflammation until complete hepatization occurs, when it

ceases to reappear if the inflammation end in resolution instead of going on to gray hepatization or suppuration, being gradually succeeded—as the lung returns to its normal state—by large crepitation, and ultimately by vesicular breathing.

Thus it appears that rhonchus and large crepitation are respectively the dry and moist sounds of the larger air-tubes; sibilus and small crepitation, of the minutest divisions of the air-tubes and ultimate vesicles of the lungs.

Humid crackle or the cavernous rhonchus, or gurgling, of some authors, is characterized by a strongly marked mucous gurgling or bubbling sound, most apparent after a full inspiration, or a fit of coughing. When it occurs at the summit of either lung it is in all probability indicative of tubercles beginning to soften: when at the middle of one or both lungs, it may result from the gurgling of fluid in a dilated bronchus; or from the passage of air through fluid in a tubercular cavity; or from abscess of the lungs; or lastly, perhaps, from diffused suppuration of the pulmonary texture, as occurs when pneumonia proceeds unchecked to its third stage.

Friction sound.—This murmur is generally difficult of detection by the ear alone, but if the hand be placed upon the affected part a sensation of rubbing is generally perceived, which is then communicated to the ear by auscultation; it attends both movements of respiration, but is loudest and most prolonged during inspiration. It occurs in pleurisy, when, the polish of the healthy serous membranes being lost by the exudation of lymph, the rubbing of the costal upon the pulmonary pleura is distinguished. It of course ceases when the exudation of serum is sufficient in quantity to separate the costal from the pulmonary pleura, but returns as the fluid poured out becomes absorbed, continuing until the lymph itself is also absorbed, or until the opposed surfaces of the pleura become adherent. It may also occur when deposits of tubercles or carcinoma are so localized as to cause roughening of the pleura, or even when interlobular emphysema gives rise to the same conditions.

AUSCULTATION OF THE VOICE AND COUGH.

The voice, though chiefly produced in the larynx by the vibrations of the air, of the chordæ vocales, and of the trachea, and passing outwards by the mouth and nostrils, has its sound also partially propagated inwards to the lungs by the air in the trachea and bronchial tubes, occasioning a vibratory sen-

sation or fremitus in the smaller bronchi, or even a more distinct vocal resonance in thin persons having a large chest and strong sharp voice.

Bronchophony.—In certain morbid states, the voice becomes indistinctly audible over portions of the lung where it is not heard in health. This phenomenon, called bronchophony or bronchial voice, is developed by the same causes that render the bronchial respiration morbidly audible, that is to say, by condensation of the lung in the vicinity of large bronchial tubes; hence it is an important symptom in pneumonia and phthisis. Bronchial respiration and bronchophony are frequently heard together; but since the sound of the voice is much louder than the sound of respiration, bronchophony may often be heard before the lung has become sufficiently solid to render bronchial breathing audible.

Pectoriloquy.—When the stethoscope is placed on the trachea, the voice articulates itself into the ear as if it came from and through the instrument. This phenomenon, natural over the trachea, is a sign of disease when heard elsewhere, and is then called pectoriloquy; it is, indeed, a loud bronchophony, and, except in extreme cases, it is often difficult to determine whether the vocal resonance shall be designated bronchophony or pectoriloquy. Pectoriloquy is generally caused by condensation of the lung around a cavity having free communication with the trachea through the larger bronchi; it may also arise from a very solid state of lung alone, or from consolidation of the lung around a dilated bronchus. It is often very difficult, if not impossible, to distinguish a dilated bronchus containing fluid from a tubercular cavity.

Aegophony is a modification of bronchophony, consisting of a peculiar resonance of the voice, resembling the bleating of a goat or the voice of Punch, following or accompanying the words of the patient. Its usual position is at the lower and posterior part of the chest, near the larger bronchi; it is so peculiar that once heard it cannot be mistaken. Ægophony was supposed by Laennec to be produced only by the bronchial resonance of voice passing through a thin layer of fluid between the pulmonary and costal pleuræ, and consequently was thought to be pathognomonic of pleurisy. It has, however, also—though rarely—been heard in simple consolidation of the lung, when no fluid could be detected in the pleura, and although its occurrence under these circumstances has not been satisfactorily explained, yet it is necessary to remember it in practice. Still it appears probable that in the majority of cases ægophony is due to the presence of pleuritic

effusion; and as it disappears when the effusion is great it may be regarded as an index of the quantity of fluid present.

Morbid Phenomena of the Cough.—The remarks just made as to the voice, will apply also to that unnatural vocal sound—cough; a few additional observations only being necessary as to a very peculiar sound called *metallic tinkling*, which is sometimes heard during ordinary inspiration, but which generally requires the act of coughing to elicit it. This physical sign, likened by Laennec "to the sound emitted by a cup of metal, glass, or porcelain gently struck by a pin, or into which a grain of sand is dropped," is made up of the *tinkling*, properly so called, caused by the fall of a drop of liquid from the upper part of a cavity into some liquid at the lower part, and of the *ring or resonance*, caused by the reverberation of the walls of the cavity, to which part of the phenomenon many stethoscopists apply the term *amphoric resonance*.

Metallic tinkling and amphoric resonance occur together only under two circumstances:—1. When a large cavity exists in the lung, containing a small quantity of thin pus, and communicating freely with the bronchial tubes; and 2, pneumothorax, when there is a fistulous communication between the lung and the cavity of the pleura. The latter is the most frequent cause of metallic tinkling.

AUSCULTATION OF THE HEART.

The size of the heart is generally estimated to be about the same size as the closed fist of the subject. The walls of the left ventricle and auricle are thicker than those of the right.

The *tricuspid valve*—or that guarding the right auriculo-ventricular opening—is situated behind the sternum, on a level with the articulations of the fourth ribs with this bone. The *mitral valve*—guarding the left auriculo-ventricular orifice—lies behind the cartilage of the fourth rib, on the left of the sternum. The *three small semilunar valves of the pulmonary artery* lie just behind the junction of the cartilage of the third left rib with the sternum. While the *three semilunar valves of the aorta* are situated immediately below the pulmonary valves, in the space between the cartilages of the third and fourth left ribs.

In listening to the sounds produced by the action of the heart, attention should be paid to the impulse, to the character and rhythm of the sounds, and to the situation in which they are most distinctly heard, as well as to the direction in which they are propagated.

To judge of the impulse, the spot where the apex of the heart beats against the chest-walls should be felt for, and the hand applied there. The stethoscope should then be placed immediately over the same spot, when the *first* or *systolic* sound will be heard. This sound has its maximum intensity over the heart's apex—below and rather to the outside of the nipple. Then placing the instrument above, and a little to the inside of the nipple, near the margin of the sternum, the *second* or *diastolic* sound will be most distinctly heard—sharper, shorter, and more superficial than the first. These two sounds may be imitated by pronouncing in succession the syllables *lubb, dup.*[1]

The first or systolic sound of the heart, dull and prolonged, coincident with the contraction or systole of the ventricles, the impulse of the apex against the ribs, and with the pulse of the large arteries, is probably chiefly caused by the contraction of the muscles, the closing of the valves, the current or wave of blood passing from one cavity into another, and perhaps by the shock of the heart's apex against the side. The second or diastolic sound, sharp and short, synchronous with the dilatation or diastole of the ventricles and with the recedence of the heart from the side, is agreed by all authorities to depend upon the sudden tension and closing of the semilunar valves, the recoil of the columns of blood in the aorta and pulmonary artery upon the upper surfaces of these delicate folds of membrane causing them to tighten with an audible check. Attempts have been made to assign the time occupied by each sound and the interval of repose. Dr. J. C. B. Williams divides the whole period from the commencement of one pulsation to the commencement of the next into five equal parts, allotting two of these to the first sound, one to the second, and two to the interval. This order of succession is called the *rhythm* of the heart. Inspiration is for the most part synchronous with the systole of the ventricles and diastole of the auricles; expiration, on the contrary, accompanies the diastole of the ventricles and systole of the auricles.

The adventitious sounds heard on the surface of or within the heart are termed *murmurs;* they are divided into pericardial and endocardial, the latter being subdivided into organic and inorganic.

Most of the alterations in the internal lining membrane of the heart result from inflammation, which gives rise to a deposit of lymph upon or beneath the serous membrane. The

[1] See Dr. Hughes Bennett's excellent "Introduction to Clinical Medicine." Second edition, p. 40.

valves thus lose their thinness and transparency, become thick, puckered up, and adherent to each other or to the opposite walls of the channel. Independently of inflammation, the valves may become covered with warty vegetations or excrescences, or they may be converted into bone. When affected in any of the foregoing ways they will act ineffectively, and an organic bellows-murmur will result.

Pericardial Friction-murmur.—Pericardial murmurs vary much in intensity, being sometimes so delicate that the closest attention is requisite for their detection, sometimes so loud that they can be heard over the whole cardiac region. Though more singular and varied than the friction-murmurs present in peritonitis or pleuritis, yet they have the same superficial rubbing, or to-and-fro character; they are generally also double, the first murmur attending the systole of the heart, the second the diastole. The rougher the lymph, and the less the serum effused with it, the louder will be the friction-murmur: it may disappear in a few hours on the effusion becoming sufficient to separate the pericardial surfaces from each other, reappearing as the serum becomes absorbed, and remaining audible either until the membrane becomes smooth and healthy, or until it becomes adherent. The friction-murmur is pathognomonic of pericarditis. When—as often occurs—endocarditis accompanies pericarditis, a bellows-murmur, from fibrinous deposits in the texture or on the surface of the valves, will coexist with the pericarditic friction-murmur, and remain audible long after its cessation.

Endocardial Murmurs.—The natural sounds of the heart are liable to be modified or changed by disease, causing either sound or both to be accompanied or to be supplanted by a noise which has been aptly compared to the blowing of a pair of bellows; hence it is termed by us a *bellows-murmur*, and by the French a *bruit de soufflet*. A bellows-murmur may be harsh, or rough, or cooing, or whistling, or musical, but these modifications are of little importance: of whatever nature, it is caused either by the presence of obstructions which impede the free flow of blood through the heart and its great vessels—producing an organic murmur; or by a supposed peculiar condition of the blood—giving rise to an inorganic murmur.

The lining membrane, valves, and orifices of the left side of the heart are much more frequently diseased than those of the right; so much so, that it is almost a question whether disease of the tricuspid or pulmonary valves can be accurately diagnosed. Diseases of the left side chiefly affect the arterial

pulse, giving rise to irregularity and inequality; those of the right side affect the venous circulation, causing regurgitation into the jugular veins—a condition known as the venous pulse. Dropsy is more often connected with disease of the right than of the left cavities.

Disease of the *semilunar valves of the aorta* is not uncommon. If the affected valves diminish the aortic orifice during systole—or contraction—so as to prevent the blood from freely flowing out of the ventricle, a systolic bellows-sound will result, which will be best heard at the base of the heart, along the course of the thoracic aorta, up towards the right clavicle, and even in the carotids; the sound diminishing as the stethoscope is moved towards the apex of the heart. If the valves close imperfectly, permitting reflex of blood from the aorta, the morbid sound will be diastolic—will accompany the dilatation of the ventricle. The pulse of aortic regurgitant disease is peculiar, being generally sudden and sharp, and without any prolonged swell of the artery: Dr. Hope calls it a jerking pulse. The short second sound of the heart will also be muffled and indistinct. Sometimes we have both these conditions of the aortic valves in the same case—a double bruit or bellows-sound will then be produced.

The *mitral valve*, which guards the left auriculo-ventricular orifice, may become thickened or ossified, the effect of which is to prevent its closing the auricular orifice during systole, as well as not to permit of its lying flat against the walls of the ventricle, so as to allow the blood to pass freely out during the diastole. In such cases the orifice is almost rendered a permanent oval slit. A double bruit may perhaps be present; the first, systolic, caused by the regurgitation of the blood from the ventricle into the auricle; the second, diastolic, and due to the impediment to the passage of the blood from the auricle to the ventricle; it is but rarely heard, however. The murmur or murmurs will be most distinct towards the apex of the heart, on the left. The pulse will be irregular. Palpation also often discovers a purring thrill.

The *semilunar valves of the pulmonary artery* are very rarely diseased; so rarely, that any organic alteration in them is a pathological curiosity. When, however, a bellows-murmur can be traced from the middle of the left-edge sternum up towards the left clavicle, and when this murmur cannot be heard in the subclavian or carotid arteries, we may perhaps assume that it originates at the orifice of the pulmonary artery. The pulse will be unaltered.

The *tricuspid valve*, guarding the right auriculo-ventricular

opening, is also but seldom found otherwise than healthy. When diseased, the arterial pulse will be unaffected, but there will be turgescence, with pulsation of the jugular veins at every ventricular systole. A bellows-murmur will be heard over the central and lower part of the sternum, extending downwards to the epigastrium, inaudible in the aorta and its branches.

To determine the systolic or diastolic character of a murmur, the pulse at the wrist must be carefully noted during auscultation; if systolic, the bruit must of course be synchronous with the pulse, and if most audible at the apex is indicative of mitral disease; if diastolic, not synchronous with the pulse, and most audible over the centre of the sternum and along the course of the aorta, it is indicative of aortic disease.

"It too often happens," says Dr. Stokes, "when the existence of a valvular disease is determined, that great labor is expended in ascertaining the exact seat and nature of the affection. Long and careful examinations are made, to determine whether the disease exists at the right or left side of the heart; whether it be a lesion of the mitral, tricuspid, or the semilunar valves; a contraction or dilatation; an ossification; a permanent patency, or warty excrescence."[1] Now these questions are unimportant compared to the following:—1. Do the murmurs really proceed from an organic cause? and 2, what is the vital and physical condition of the muscular portions of the heart?

Inorganic Murmurs—much less formidable than the organic—accompany impoverished conditions of the blood, especially those depending on a defect in the red globules; they are heard in those conditions of the system known as anæmia, chlorosis, &c., and result from starvation, loss of blood, sexual excesses, and other circumstances producing great depression. On auscultation over the base of the heart, a loud systolic bruit or bellows-sound will frequently be detected, and may be traced distinctly up the aorta, and in the subclavian and carotid arteries. By placing the stethoscope over the jugular vein, especially over the right, a continuous humming, or cooing, or even whistling sound—the *bruit de diable*—will be heard; a sound which is probably caused, as Dr. Ogier Ward first pointed out, by the descent of attenuated blood through the great cervical vessels; although some authorities regard the carotid artery as its seat. The researches of Dr. Liman, of Berlin, show that this bruit is sometimes heard during perfect health, especially in the young.

[1] Diseases of the Heart, p. 131.

SECTION 3. THE PHYSICAL DIAGNOSIS OF DISEASES OF THE ABDOMEN.

The organs contained in the abdominal cavity can hardly be considered of the same vital importance as the brain, lungs, or heart; still the correct performance of the functions of the abdominal viscera is most important to the welfare of the individual, and the careful study of their diseases is incumbent on every practitioner, since they cause much suffering, and ultimately often destroy life.

Regions of the Abdomen.—For convenience in the description of its diseases, the abdomen, like the chest, is arbitrarily divided into regions. Thus we have, from above downwards:

The epigastric—and right and left hypochondriac.
The umbilical—and right and left iliac.
The hypogastric—and right and left inguinal.

If a horizontal line be drawn round the body, touching the extremity of the ensiform cartilage, this will form the superior boundary of the abdomen; draw another such line on a level with the cartilages of the last false ribs, and a third on a level with the crests of the ilia; we shall thus have three horizontal zones. These are to be subdivided each into three regions by drawing two vertical lines—one on either side—from the middle of Poupart's ligament perpendicularly upwards. The three central regions thus formed are named—from above downwards—the epigastric, the umbilical, and the hypogastric; on either side of the first are the right and left hypochondriac; of the second, the right and left iliac; of the third or lowermost zone, the right and left inguinal.

Modes of Physical Examination.—Five methods of physical examination are resorted to in the diagnosis of diseases of the abdomen, viz.:—1. *Inspection*, by which much valuable knowledge is obtained as to the shape, the positive and relative size, and the situation and movements of the abdominal viscera; 2. *Mensuration*, by which we confirm the evidence obtained by inspection; 3. *Palpation*, by which the size, situation, consistence, and tenderness of the different organs may be estimated, and the presence of tumors when they exist; 4. *Percussion*, which often affords most important information, teaching us the situation of the intestines, and whether the parts beneath are hollow and filled with air, or whether there is fluid in the peritoneum, or whether there are any solid tumors; and 5. *Auscultation*, which is of especial value in the determination of pregnancy, of aneurisms of the abdominal aorta, and of tumors generally.

1. Inspection.

In examining the abdomen by the sense of sight, it is necessary, in the majority of cases, that it be uncovered and exposed to a good light, which may be carefully done without any offence to the patient's delicacy. The person to be examined may be in the erect or recumbent posture, with the arms hanging loosely by the side. When the abdominal walls and viscera are healthy, the general form of the abdomen is gently convex, both sides being symmetrical, and presenting here and there slight rounded projections and depressions. Partial abdominal enlargement will be manifested by unnatural fulness or bulging of any part of the abdominal parietes, the situation depending upon the cause: in general enlargement, the whole abdomen will bulge forward, to a slight degree, when the enlargement is due to a general increase in the thickness of the parietes of the abdomen; more so when the abdominal organs are increased in bulk; and most of all when there is an accumulation of gaseous, liquid, or solid matters within the intestines, or within the cavity of the peritoneum. Fæculent accumulations take place mostly in the large intestines, and in the lower part of the ileum, causing distension of the colon and cæcum, manifested by irregular prominence in the right iliac, both hypochondriac, and left iliac regions. Disease of the liver gives rise to enlargement of the right hypochondriac and epigastric regions; while enlargement of the spleen produces a projection of the lower left ribs at the side, and a tumor in the left hypochondrium. Tubercular disease of the mesenteric glands is generally accompanied by enlargement of the whole abdomen, and by deviations from its natural form and symmetry. In ascites, the smooth roundness of the abdominal swelling is peculiar, so that when the fluid is abundant the abdominal cavity is expanded into a large, smooth, and almost polished globe; while in pregnancy and in encysted ovarian dropsy the tumors can be traced deeply into the pelvis.

2. Mensuration.

In measuring the abdomen, a common tape measure will be found the most useful. The measurements are usually made at the margin of the lower ribs and the umbilicus, and when the abdomen is partially distended, at and around the most prominent region.

3. Palpation.

For accurate palpation, the hand should be applied directly to the surface, using more or less pressure as we wish to

determine the condition of the walls or of the deep-seated viscera, and according to the existence or non-existence of tenderness; occasionally the whole of the palmar surface of the hand should be used, occasionally only the tips of the fingers, which are very sensitive. In health the abdomen is generally soft, and the walls are moderately elastic in each region. Tumors are discovered by their resistance to pressure, by their hard feel to the touch, and by the contrast which the parts occupied by them present to the healthy regions. Care must be taken not to mistake—as is often done—the contraction of the central portions of the recti muscles for ovarian and other tumors. This error may be avoided by keeping the flat hand firmly and steadily applied, while the patient's attention is attracted to other matters, when the muscles will be found to relax, or so much to vary their degree of tension as to show the cause of the hardness. The right rectus is often more tense than the left, especially if there be any tenderness of the liver.

The practice of palpation is eminently useful in the diagnosis of the following diseases:

Acute Inflammation of the Liver is signalized by pain, more or less severe, in the region of the liver, increased on pressure, deep inspiration or cough; inability to lie on the left side; a yellow tinge of the conjunctiva, sometimes jaundice; dyspnœa; cough; vomiting; and hiccough. When the pain is of a sharp, lancinating character, it is supposed to indicate inflammation of the serous covering of the gland; when dull and tensive, the parenchyma is the part affected; when the convex surface of the organ is the seat of the inflammation, the chest symptoms will predominate; when the concave, the stomach symptoms will be the most marked.

In Acute Inflammation of the Peritoneum the pain is generally very severe, soon spreads over the whole abdomen, and is aggravated by any movement which calls the abdominal muscles into action, or by pressure—even the weight of the bedclothes being insupportable: the patient consequently lies quiet on his back, with his knees bent, and legs drawn up. On careful examination, a sensation of friction will often be communicated to the hand, which has been likened to a gentle vibration under the fingers, or to a sensation of creaking, or grating, or crepitus. The abdomen is tense, hot, and frequently tympanitic; the bowels are constipated: there is often nausea and vomiting; the skin is hot and dry; the pulse rapid and weak; the respiration hurried; the tongue furred; and the countenance is expressive of suffering and great

anxiety. After a time the belly ceases to be tympanitic, but remains somewhat enlarged from the effusion of serum. When a fatal termination is approaching, the abdomen often becomes much distended, the pulse very quick and weak, the countenance ghastly, and death occurs from exhaustion.

Ascites, or Dropsy of the Peritoneum, arises from many causes, but most frequently from cirrhosis. The extent of the abdominal enlargement will of course depend upon the quantity of liquid present, but the distension will always be uniform; fluctuation will generally be distinct; and there will, in most cases, be resonance over the higher parts of the belly on percussion, owing to the floating of the intestines, thus prominently distinguishing ascites from ovarian dropsy. I say, in most cases, for the distension may be so great that the breadth of the mesentery may be insufficient to allow the intestines to reach the surface of the fluid; dulness will then, of course, result. I have noticed, however, that where there is any difficulty in the diagnosis of ascites and ovarian dropsy, the mere fact of difficulty may be taken as presumptive evidence in favor of the case being one of ascites. Ovarian dropsy very rarely simulates ascites. In both diseases there will be dyspnœa, which will be urgent in proportion to the distension.

Ovarian Dropsy consists in the conversion of the ovary, or of parts of it, into cysts; generally perhaps by enlargement of one or more of the Graafian vesicles. Under the same name, simple serous cysts formed in the broad ligaments, and dropsy of the Fallopian tubes arising from closure of their extremities, have been included.

The first symptom of an ovarian tumor is enlargement of the lower part of the abdomen—generally of one or the other iliac regions. If palpation be practised, a tumor may be felt; but patients rarely apply for advice until the cyst has obtained considerable size. Fluctuation will then be distinguished with ease or difficulty, according to the nature of the tumor and its contents. In all cases there will be a dull sound on percussion over the tumor.

An ovarian cyst may be single or multilocular; that is to say, it may consist of one sac only, or it may be made up of a variable number of small cysts. All ovarian tumors run their course much more rapidly than is generally supposed. Cases of fibrous tumors of the uterus, which often exist for years without any suffering, are repeatedly mistaken for ovarian tumors. So also are concretions arising from the accumulation of various indigestible matters in the bowels,

especially when they occur in the ascending or descending portion of the colon, and when they are large and slightly movable. Adhesions often form between ovarian tumors and the peritoneum; I believe that they may be distinguished by every physician possessing the *tactus eruditus*.

Dilatation of the Stomach is a curious disease, to which attention has lately been directed. It is due generally to some affection of the pylorie orifice, which, causing contraction, prevents the food from readily passing into the duodenum. Hence the stomach slowly and gradually dilates, until at last it comes to occupy almost the whole of the abdominal cavity, giving rise to appearances as if a tumor were present. These appearances are the more deceitful when the stomach is full, because fluctuation may then be present; when this viscus is empty, there will be a tympanitic sound on percussion.

Abscesses of the Liver sometimes attain a great size, and, in extreme cases, may contain several pints of pus. Fluctuation will then be perceptible, but only over the region of the liver, where also a tumor will be felt. They may burst into the peritoneum, and give rise to fatal peritonitis; most frequently, however, when the matter gets near the surface of the gland, adhesive inflammation it set up in the portion of peritoneum immediately above it, and lymph is poured out, which glues the organ to adjacent parts—to the abdominal parietes, the diaphragm, stomach, or some part of the intestines; the pus is then discharged externally, or into the lung or pleura, or stomach, &c.

Abnormal Pulsations.—The pulsatory movements of the abdominal aorta are generally lost to the touch, although they may become evident both to the sense of touch and of sight when the parietes are wasted, and the movements violent, as in anæmia, or in disease of the coats of the vessel, or when a tumor or a cancerous mass lies directly over the artery. The pulsations are usually best seen at the epigastrium, and sometimes at the umbilicus; on applying the hand, a jerking, quick, strong, forward impulse is felt; while auscultation often discovers a bellows-murmur, especially if anæmia coexists. I have found this pulsation not uncommon in cases of uterine disease; it has also been frequently noticed in hypochondriacs, in those whose digestive organs are deranged, in chlorotic females, &c.

4. Percussion.

In the diagnosis of abdominal diseases, mediate percussion is for the most part employed, the middle finger of the left

hand forming an excellent pleximeter. Over the region of the liver the sound elicited is dull: over the stomach, when empty, slightly hollow; or when filled with gas, tympanitic: over the colon, when distended with air, resonant; when loaded with fæces, dull: while over the small intestines there is generally resonance. Over all the intestines a sense of elasticity is imparted to the percussing fingers. When the liver is increased in size, or when the spleen or the kidneys are enlarged, or when any solid tumor occupies the peritoneal cavity, there will be dulness on percussion in proportion to the extent of the solid matter. When, owing to perforation of the intestines, there is air in the peritoneum, the sound on percussion will be tympanitic, while the elasticity of the abdomen will be increased; when fluid or fæcal matter has been effused, there will be dulness. The great pain and constitutional disturbance, however, will prevent any examination but a cursory one.

Obstruction of the Bowels is a disorder, the diagnosis of which will be much facilitated by the careful practice of percussion, aided by palpation. This fearful accident—so to speak—may arise from several conditions, which I shall briefly consider on account of the great importance of the subject, premising that it may occur at any part of the bowels from the duodenum to the rectum, and that when there is obstruction with fæcal vomiting the disease is called *ileus*. *Strangulated hernia* is perhaps the most frequent cause of obstruction; consequently, in every case of obstinate constipation with sickness, the practitioner should make a careful examination of those parts of the abdomen, thigh, hip, and in women, of the vagina, at which the intestines may descend. *Intestinal concretions* or *calculi* will also produce obstruction, and so will *polypi*. In the museum of the Westminster Hospital there is a preparation, showing a polypus entirely blocking up the jejunum. *Intussusception*, which consists of a slipping of a superior portion of the intestinal tube into an inferior, will also give rise to it. A part of the bowel may become strangulated by *preternatural bands*, the result perhaps of previous peritonitis, or by *elongations of the peritoneum*. Dr. Watson says he has twice seen the appendix vermiformis prove the cause of fatal internal hernia. In one case, the free end of the appendix became adherent to the mesocolon, forming a loop, through which a portion of the gut passed and became constricted. In the other instance the appendix was literally tied round a piece of the intestine. In a case which I saw at King's College Hospital, a diverticulum from the

small intestines was connected with the abdominal parietes close to the umbilicus, forming a ring, through which part of the ileum had passed and become strangulated. A part of the bowel may likewise become *strictured*, either from simple thickening of its coats, or from malignant disease; or *the uterus may become retroflexed*, or *retroverted*, and by pressing upon the rectum materially diminish its calibre; and, lastly, *the muscular fibres of the intestine may become paralyzed* from over and long-continued distension, just as sometimes happens in the ease of the urinary bladder.

The principal symptoms of obstruction are constant vomiting, which is at first simple—consisting of the contents of the stomach, and mucus, but which in a few days becomes stercoraeious or fæeal; pain varying in degree, often very severe; great mental depression; and the pathognomonic symptom—constipation. The physical signs are such as indicate a state of emptiness below the seat of obstruction, and of distension above it. When the small intestines are greatly distended their convolutions are often traceable, and they may be felt by the hand to roll about with loud borborygmi; at the same time the abdominal enlargement and the distended small intestines obscure the resonant sound given out by the colon when empty. When the obstruction is seated only a little above the cæcum, this part may form a large dilated tumor in the right iliac region. When in the colon or rectum, assistance may often be derived from introducing the finger; or, if the obstruction be higher than the finger can reach, by using an elastic rectum tube, or by injecting warm water, and observing how much can be thrown up. The lower the obstruction is situated the less urgent will be the vomiting; if, for instance, it is in the duodenum, the vomiting will be incessant from the beginning; if in the colon, it may be absent for some time. It might be thought that the ilio-cæcal valve would prevent the return of the contents of the colon into the ileum; the preliminary dilatation, however, renders this valve quite patulous. When urine is freely secreted, the obstruction cannot be very high up.

5. Auscultation.

Auscultation of the Abdomen in Health and Disease.—The audible movements which occur within the abdomen in health are two: 1. The movements of alimentary or secreted matters, as gas, within the digestive tube, either by the spontaneous action of the canal itself, or as the result of

manipulation; and, 2, the movement of the blood in the vessels.

On applying the stethoscope over the stomach, an almost constant succession of gurgling sounds is heard when it contains liquid and gaseous matters, owing to the commingling of these. The sounds emitted from the intestines—borborygmi—arise from the passage of the gas they contain through insufficient spaces from one part of the tube to another; they occur abundantly during the contractions which ensue on the operation of a purgative, and they may be at once induced by a draught of cold water.

The pulsations of the aorta are occasionally heard during health in spare subjects; they disappear opposite the division of the vessel into the iliac arteries.

In disease these sounds are merely modified as regards their clearness and extent. When the surfaces of the peritoneum are roughened by inflammation a *friction-murmur* may often be detected; this sound is often audible in cases where friction-vibration cannot be felt.[1]

Auscultation of the Abdomen during Pregnancy furnishes us with two very important signs—one derived from the uterus, the other from its contents. To detect them the patient should lie on her back with her shoulders raised, and the legs drawn up, in order to relax the abdominal integuments. *The uterine murmur*, known as the placental murmur or uterine soufflet, has its origin probably in the bloodvessels of the uterus, and not, as was thought, in the placenta. My own reason for discarding the latter opinion is, that I have frequently heard a similar murmur in large fibrous tumors of the uterus, and have been helped thereby to diagnose such tumors from those caused by cystic disease of the ovary. M. Cazeaux has suggested that an altered condition of the blood may help to produce it. The character of the sound is that of a rushing, blowing murmur, synchronous with the maternal pulse, unaccompanied by any impulse, and requiring careful examination for its detection. It is generally first heard towards the end of the fourth calendar month, though it has been detected as early as the tenth week; it is frequently audible over the whole of the uterus, but is usually most developed over one or both inguinal regions. Its presence affords no evidence as to the life or death of the fœtus.

The pulsations of the fœtal heart afford a double sound somewhat resembling the ticking of a watch, varying in fre-

[1] See Dr. Ballard's valuable volume on the Diagnosis of Diseases of the Abdomen.

quency from 120 to 160 in a minute, and having no relation with the pulse of the mother. The pulsations are best detected between the umbilicus and the anterior superior spinous process of the ilium, on either side, but most frequently to the left; they are rarely audible before the end of the fifth month of pregnancy, and they become more distinct as gestation advances. When discovered they prove a certain sign of the presence of a live fœtus.

Occasionally *the movements of the fœtus* can be detected both by palpation and auscultation, about the time that the fœtal heart is heard; and, according to Dr. Kennedy, "*the funic souffle*," weaker than the uterine murmur and synchronous with the fœtal heart, may sometimes be detected by the ear. In the course of a large number of examinations, however, I have never discovered the latter sound.

CHAPTER VIII.

GENERAL OBSERVATIONS ON THE DIAGNOSIS OF THORACIC DISEASES.

In exploring the diseases of the lungs and heart by the physical methods of diagnosis, it must be remembered that the signs derived from these sources are not to be solely trusted to, but that every circumstance bearing upon the case under examination is important, and must consequently be taken into consideration if we would wish our judgment to be unbiassed and our opinion correct. The maxim of the old logicians—that it requires all the conditions to establish the affirmative, but that the negative of any one proves the negative—is in the main true as regards the diagnosis of many diseases. Thus, in suspected valvular disease of the heart, if the sounds be healthy, unattended by any murmur, we may be sure, however strong the other symptoms may be, that the suspicion is not well founded; but the converse does not hold good, that a bellows-murmur being present, there is consequent valvular affection. In order to aid the student in studying the chief pulmonary and cardiac affections I have devoted the present chapter to the consideration of their general diagnosis, and I trust it will not be thought unworthy of the close attention of the reader.

BRONCHITIS.

Inflammation of the bronchial tubes may be acute or chronic.

Acute Bronchitis is a dangerous disorder, more especially on account of the frequency with which the inflammatory action spreads to the vesicular texture of the lungs.

The symptoms consist of fever, a sense of tightness or constriction about the chest, hurried respiration with wheezing, severe cough, and expectoration—at first of a viscid glairy mucus—which subsequently becomes purulent. The pulse is frequent and often weak; the tongue foul; and there is headache, lassitude, and great anxiety.

On practising auscultation in the early stage of the inflammation, two *dry* sounds will generally be heard, viz., *rhonchus* and *sibilus*, both of which indicate that the air-tubes are partially narrowed—that the mucous membrane lining them is indeed dry and tumid. Rhonchus in itself need give us no anxiety, as it belongs entirely to the larger divisions of the bronchial tubes; sibilus, on the contrary, bespeaks more danger, since it denotes that the smaller air-tubes and vesicles are affected. After a time, the inflamed mucous membrane begins to pour out fluid—a viscid, transparent, tenacious mucus is exhaled; this constitutes the second stage of the inflammation. Two very different sounds to those just noticed are then to be detected, viz., *large crepitation* and *small crepitation*—often called the *moist* sounds. As the air passes through the bronchial tubes it gets mixed, as it were, with the mucous secretion, so that numerous air-bubbles keep forming and bursting. When this occurs in the larger branches, it gives rise to large crepitation; when in the smaller, to small crepitation. We have, therefore, rhonchus and large crepitation, as respectively, the dry and moist sounds of the larger air-passages; sibilus and small crepitation, as those of the smaller branches. On practising percussion, no appreciable alteration in the resonance of the chest will be discoverable. If relief be not afforded by the copious expectoration, or by remedies, the disease assumes a more dangerous character, the strength becomes much reduced, signs of great pulmonary congestion ensue, and symptoms of partial asphyxia follow, soon ending in death. In favorable cases, however, the affection begins to decline between the fourth and eighth day, and shortly either entirely subsides, or passes into the chronic form.

Chronic Bronchitis is very common in advanced life. The slighter forms are indicated only by habitual cough, some shortness of breath, and copious expectoration. The majority

of cases of winter cough in old people are examples of bronchial inflammation of a low lingering kind. It may arise idiopathically, or it may follow an acute attack.

PLEURISY.

Pleuritis, or pleurisy, are terms applied to inflammation of the pleura—the serous membrane investing the lungs and lining the cavity of the thorax. The inflammation is of the adhesive kind, and is accompanied by the pouring out of serum, of coagulable lymph, of pus, or of blood.

The disease is ushered in with rigors followed by fever, and an acute lancinating pain in the side, called a stitch, which pain is aggravated by the expansion of the lung in inspiration, by coughing, by lying on the affected side, and by pressure: there is also a short harsh cough, the skin is hot and dry, the cheeks flushed, the pulse hard and quick, and the urine is scanty and high colored. If we listen to the painful part of the chest at the commencement of the attack, we shall hear the dry, inflamed membranes—the pulmonary and costal pleuræ—rubbing against each other, and producing a *friction-sound;* if the hand be placed on the corresponding part of the thorax, this rubbing may also be felt. But the sound soon ceases; for either the inflammation terminates in resolution and complete recovery, or the roughened surfaces become adherent, or they are separated by the effusion of serum, and a kind of dropsy results, known as *hydrothorax.* If the pleurisy has been severe, the effusion becomes excessive (it may vary from an ounce to several pints), and the fluid accumulating in the sac of the pleura compresses the yielding lung, suspends its functions, displaces the heart, and somewhat distends the thoracic parietes. When the serous fluid is mixed with pus, the disease is termed *empyema.* If we listen to the chest now, we shall find the respiratory murmur diminished, in proportion to the quantity of fluid thrown out: where this is excessive and the lung is compressed backwards—flattened almost against the spinal column—no vesicular breathing at all will be audible, but instead we shall hear the air passing into the larger bronchial tubes, while the voice will be also abnormally distinct, the condensed lung and the layer of fluid acting as conductors of sound; we then say that *bronchial respiration* and *bronchial voice* or *bronchophony* exist. The bronchophony may be accompanied by a tremulous noise, resembling the bleating of a goat; it is then termed *ægophony.* If the lung be completely compressed, so that no air can enter even the bronchial tubes, then no sounds of any kind will be heard; but

on the healthy side the respiration will be more distinct than natural—will be *puerile*. There will also be dulness on percussion all over the affected side, if the pleura be full of fluid; if it be only partially filled, we can judge of the quantity by placing the patient in different attitudes; for since the fluid will gravitate to the most dependent part of the cavity, so it will carry the dull sound with it. We shall also often be able to judge of the amount of the effusion by the dyspnœa which the patient suffers from, since this will, of course, be most urgent when the lung is most compressed. At this stage also the sufferer is unable any longer to lie on the sound side, clearly because the movements of the healthy lung would be impeded by the superincumbent weight of the dropsical pleura; the pain, moreover, no longer prevents his resting on the diseased side. If we measure the two sides of the chest, the side containing the effusion will be found the largest; we must remember, however, that in many persons the right half of the chest is naturally rather larger than the left.

After a time the symptoms begin to decrease, and absorption of the effused fluid commences. Supposing the lung to be bound down by adhesions, it will not expand in proportion to the absorption of the fluid; the affected side will then shrink inwards, and instead of any longer remaining larger than the sound side, will become smaller.

PNEUMONIA.

Pneumonia, or inflammation of the substance of the lungs, consists of three degrees or stages, viz.: 1, that of engorgement; 2, that of hepatization; and 3, that of gray hepatization or purulent infiltration. In each stage there is fever; more or less pain in some part of the chest—most severe at the commencement of the attack; accelerated and oppressed breathing; occasionally delirium; cough; and expectoration of viscid, rust-colored sputa, which unite into a mass so tenacious, that even inversion of the vessel containing the collection will not detach it.

In the first stage, or that of engorgement, the substance of the lung becomes loaded with blood or bloody serum. It is of a dark red color externally, and on cutting into it a quantity of red, frothy serum escapes, while its appearance somewhat resembles the spleen. If we listen to the chest when the lung is in this condition we shall hear very fine crepitation, which is known as *small crepitation*, or *crepitant rhonchus*. If a lock of one's own hair be rubbed between the finger and thumb

close to the ear, a sound will be produced resembling it. The natural respiratory or vesicular murmur is still heard mingled with this minute crepitation, especially at first; as the inflammation advances, however, the healthy sound is quite displaced by the morbid one. Percussion also, at first, affords the natural resonance, which gradually becomes obscured.

If the inflammation proceed, it passes into *the second stage, or that of hepatization*, in which the spongy character of the lung is lost, and it becomes hard and solid, resembling the cut surface of the liver—whence it is said to be hepatized. If we now practise auscultation, neither the minute crepitation nor the vesicular murmur are any longer perceptible. *Bronchophony*, however, often exists, more particularly if the inflammation be seated near the upper part or in the vicinity of the root of the lungs; it is accompanied also by *bronchial respiration*, these sounds being conducted by the solidified lung. The sound on percussion is dull over the whole of the affected part.

Advancing still further, we now have *the third stage of pneumonia, or that of gray hepatization, or purulent infiltration*, which consists of diffused suppuration of the pulmonary tissue. Circumscribed abscess of the lung is very uncommon, but diffused suppuration is a frequent consequence of inflammation. There are no physical signs by which this stage can be diagnosed, until part of the lung breaks down and the pus is expectorated; *humid crackle* or *large gurgling crepitation* will then be heard.

If the inflammation subside before the stage of purulent infiltration, as it fortunately often does, then the hepatized condition may remain permanent, or may gradually cease: in the latter case we shall find the air slowly re-entering the lung, as will be indicated by a return of the minute crepitation, mingled with—and subsequently superseded by—the healthy vesicular murmur.

Occasionally, in depressed constitutions, acute inflammation of the lung terminates in *gangrene*. The characteristic symptom of such an occurrence is, an intolerably fœtid state of the breath, resembling the odor which proceeds from external gangrenous parts. Unless the mortified portion be small, death will, in all probability, result.

Pneumonia may affect one lung or both, or, technically speaking, may be double or single. The right lung suffers from inflammation twice as often as the left; about once in eight cases both are affected. The lower lobes are more obnoxious to inflammation than the upper. The average duration of the disease is about ten days.

Pneumonia without bronchitis is probably never seen. It may occur with or without pleurisy; when the pneumonia forms the chief disease, the double affection is termed *pleuro-pneumonia;* when the pleurisy predominates, it is sometimes called *pneumo-pleuritis.*

ASTHMA.

Asthma may be defined as consisting of paroxysmal attacks of dyspnœa, accompanied with a wheezing sound of respiration, the attacks ending, generally, in a few hours, with mucous expectoration more or less abundant. The paroxysms appear to be due to obstruction of the smaller bronchi from tonic contraction of the circular muscular fibres.

A fit of asthma is either preceded by various digestive, or nervous, or other disturbances; or it occurs suddenly, without any warning. The patient awakes an hour or two after midnight with a sensation of suffocation, or constriction about the chest; the efforts at inspiration are convulsively violent; the expiration is prolonged, and comparatively easy; both acts, but especially the first, are attended with wheezing, and occasionally rhonchus and sibilus are heard in place of the natural respiratory murmur. Various postures are assumed to facilitate the attempt at filling the lungs; the patient stands erect, or leans his head forwards on his hands, or rushes to the open window—at which he will remain almost for hours gasping for air. The pulse is small and feeble; the eyes staring; the countenance anxious; the skin cold and clammy. His whole appearance is most distressing, and he looks beseechingly at the practitioner for relief from his misery. Then, after a certain lapse of time, comes a remission; cough ensues, and with the cough expectoration of mucus; and soon the paroxysm ceases, to allow the sufferer to fall into the long-desired sleep.

When the attack ceases with expectoration, the case is said to be one of *humid* or *humoral* asthma; when without, it is called *dry* asthma. Both forms are often connected with emphysema of the lungs, and with disease of the heart. When the attacks are merely nervous, the patient enjoys good health during the intervals; when there is chronic bronchitis, or emphysema, or heart disease, the symptoms of these conditions remain more or less prominent.

Repetition of asthmatic fits often leads to dilatation of the right cavities of the heart, and to insufficiency of the tricuspid valve; this occurs most frequently when there is emphysema.

EMPHYSEMA.

The diseases of the lungs thus denominated are of two kinds. One consists essentially of enlargement of the air-cells, atrophy of their walls, and obliteration of their vessels; this is called *vesicular* or *pulmonary emphysema*. When, on the other hand, there is infiltration of air into the interlobular areolar tissue, or into the sub-pleural areolar tissue, the disease is known as *interlobular emphysema*. Both forms give rise to habitual shortness of breath, with occasional severe paroxysms of dyspnœa or orthopnœa, resembling asthma; they are at all times very distressing complaints, and quite unfit the sufferer for any active occupation. Emphysema is a common cause of asthma.

The physical signs consist of unnatural clearness and resonance on percussion, while only a very indistinct vesicular murmur is heard on auscultation. The diseased side of the thorax is also more prominent and rounder than the healthy one. Thus, as regards percussion and auscultation, emphysema affords results the reverse of most other affections: the disease consisting, as it were, of a superabundance of air, which is not in motion, and hence does not pass away, there is more resonance on percussion, but less respiratory sound on auscultation.

PNEUMOTHORAX.

The jagged ends of a fractured rib will often wound the pulmonary pleura, and thus allow the air to escape from the lung into the pleural sac. The same condition may arise from an external wound, or from ulceration during the extension of a tubercular cavity. When the pleura contains air alone, we say there is *pneumothorax;* when, as generally happens, there is liquid with the air, we call the disease *hydro-pneumothorax*, or *pneumothorax with effusion.*

The physical signs of pneumothorax are great resonance on percussion, with indistinctness of the respiratory murmur on auscultation; while the patient's voice and cough give rise to a ringing metallic noise, like that produced by blowing obliquely into an empty flask, and hence called *amphoric resonance.* When there is also liquid with the air, we obtain in addition, on practising succussion, a sound known as *metallic tinkling,* which results from a drop of fluid falling from the upper part of the cavity into the liquid below, and causing a little splash.

PHTHISIS.

Tubercular phthisis, or pulmonary consumption, is a constitutional disease manifesting itself chiefly by certain changes in the lungs.

Tubercle, or tuberculous matter, is the specific product of a peculiar constitutional disease. It is deposited in distinct isolable masses, or is infiltrated into the tissues of many different organs; most frequently, however, it is found in the lungs, constituting pulmonary tuberculosis, or tubercular disease of the lungs, or phthisis, or consumption, these terms being synonymous. The morbid condition of system which gives rise to this production, wherever it may be deposited, is now usually known as tuberculosis, or tubercular disease: the tendency to it is often hereditary. According to Rokitausky, pulmonary tubercles are found in two varieties, or in forms intermediate between them, viz., as the gray or miliary, and the yellow tubercles. By some it is supposed that these varieties merely represent two stages of the same disease. Rokitansky maintains, however, that they are always different substances, and that although they often coexist in the same lung, yet that they never become transformed the one into the other. Be this as it may, it is certain that the minute structures of both are essentially similar. Of course, there has been a vast amount of speculation as to the mode of formation and nature of tubercle. The best explanation, and that to which many authorities—as Lebert, Ancell, and Dr. John Hughes Bennett—subscribe, is that it consists of an exudation of the liquor sanguinis, presenting marked differences from the simple or inflammatory exudation on the one hand, and the cancerous exudation on the other. From its chemical analysis, it would appear to consist of animal matter—principally albumen—and certain earthy salts, chiefly the insoluble phosphate and carbonate of lime, and the soluble salts of soda.

In phthisis the tubercular deposit takes place in the areolar tissue between the air-cells, in the air-cells themselves, and in the smaller bronchial tubes communicating with them; wherever a speck of this matter is deposited from the blood, it continues to increase by constant addition. In its hard state it is called *crude tubercle*. After a time, inflammation arises in the pulmonary substance around the deposit, suppuration occurs, the tubercular matter softens and breaks down, and at length is gradually expelled through the bronchi, trachea, and mouth, leaving cavities or excavations behind, of various

sizes. Sometimes these cavities close and heal; more frequently tubercular matter continues to be deposited on their sides and in other parts of the lungs, until these organs become diseased to an extent incompatible with life.

The *general symptoms* of phthisis are cough, debility, mucopurulent expectoration, acceleration of the pulse, dyspnœa, hæmoptysis, loss of flesh, hoarseness, a peculiar transparent appearance of the edge of the gums where they are reflected over the teeth, sweating, and diarrhœa. The disease ordinarily sets in with a short dry cough, which may continue some time without being aggravated, or without the supervention of any other symptom. Frequently there is hæmoptysis, which, recurring at variable intervals, gives the first intimation of the disease. The patient complains also of languor; slight exertion—ascending a hill or going up stairs—causes fatigue, hurries the breathing, and often gives rise to palpitation. When this state has lasted for some time, during which the cough and expectoration have been increasing, hectic fever appears. The debility becomes more marked; the countenance is frequently flushed; chilliness is complained of in the evening, while on awaking in the morning the body is found bathed in a profuse sweat; and there is loss of appetite, with thirst, &c. The patient now rapidly loses flesh; diarrhœa often sets in and increases the feebleness; the lower extremities become œdematous; and death soon ends the scene.

Some authors have divided phthisis into three stages. During the *first*—that in which tubercles become developed in the lungs—neither the local nor the general symptoms warrant us in announcing the presence of any other affection than severe catarrh; if the tubercles be deposited, however, in considerable quantity, the sound on percussion will be dull, the act of expiration will be prolonged—from impairment of the elasticity of the lungs, and *bronchial respiration* and *bronchophony* will be heard; the vesicular murmur will be feeble or even absent. In the *second* stage, the tubercles increase both in number and size, so as to compress and obstruct the substance of the lung, and occasion dyspnœa; large crepitation will be distinct, and in the sound lung puerile breathing. In the *third* stage, the tubercles become softened; they make an opening for themselves through some of the surrounding or involved bronchi, and being thus evacuated, they give rise to the formation of cavities. Auscultation now elicits a peculiar sound, called *gurgling* or *humid crackle*, caused by the bubbling of air with the pus or mucus contained in the cavity. Gurgling, it must be remembered, may also arise from that

rare disease, circumscribed abscess of the lungs, as well as from the mixture of air with liquid in a dilated bronchus affected with chronic inflammation. When the cavity contains no liquid, we hear *cavernous respiration;* if it be large, *amphoric resonance* and *pectoriloquy* will also be distinguishable. Notwithstanding the existence of one large or of numerous cavities, percussion almost invariably affords a dull sound, owing to the layer of lung forming the wall of the cavity being dense and solid.

Phthisis may be inherited or it may be acquired; it is not contagious. Of 1000 cases collected by Dr. Cotton, at the Consumption Hospital, 367 were hereditarily predisposed; 582 were males, and 418 females. The left lung suffers more frequently than the right; in Dr. Cotton's cases the left lung was affected in 455, the right in 384, and both in 161. The apices and posterior parts of the upper lobes of the lungs are ordinarily the situations in which the deposit first takes place.

No period of life is exempt from this scourge. Insufficient and bad food, impure air, confinement, deficiency of light, and immoderate indulgence of the sensual passions may be regarded as frequent causes. Its ordinary duration is about six or nine months: it rarely proves fatal in three months.

PERICARDITIS.

Inflammation of the external serous covering of the heart—pericarditis—frequently arises from cold, from mechanical injuries, from a contaminated state of the blood produced by renal disease, and from acute rheumatism.

The symptoms of this affection are, high fever; pain referred to the region of the heart, often darting through to the left scapula, upwards to the left clavicle and shoulder, and down the arm; violent palpitation, the motions of the heart being tumultuous, and perceptible at a distance from the patient; irregularity of the pulse; hurried respiration; incapacity of lying on the left side; strong pulsation of the carotids; anxiety of countenance; and frequently noises in the ears, giddiness, and epistaxis. As the disease advances, there is extreme debility, cough, suffocative paroxysms, occasionally a tendency to syncope, and œdema of the face and extremities. These symptoms often vary much in different cases; thus, as Dr. Hope has remarked, if the effusion which results from the inflammation consists almost entirely of coagulable lymph, or if the serum thrown out has been rapidly absorbed and adhesions early effected, the circulation will be less interfered with, and less suffering will result, than in those more formidable

instances where there is a copious fluid effusion painfully distending the inflamed membrane, pressing upon the heart, and embarrassing its movements.

On practising auscultation, we shall find—in the earliest stages—increased intensity of the natural sounds; if endocarditis coexists, as it so frequently does, a loud systolic *bellows-murmur* will also be heard. Very early, too, a distinct friction, or *alternate rubbing*, or a *to-and-fro-murmur*—as Dr. Watson terms it—will be audible. The bellows-murmur indicates fibrinous deposits in the texture as well as on the surface of the valves, from inflammation of the internal membrane of the heart—the endocardium—and it generally continues for life. The to-and-fro or friction murmur is indicative of inflammation of the pericardium, and it generally ceases in a few days, when this membrane becomes adherent to the heart, as it almost always does if the patient survive. When copious effusion takes place, we shall have dulness on percussion over a larger surface than in health; if the fluid does not become absorbed, we say that *hydro-pericardium* exists, which usually proves fatal.

From the foregoing it appears that we may classify the physical signs of pericarditis as follows:

1. Sensations of friction communicated to the hand.
2. Friction-sounds: the "attrition murmurs" of Hope.
3. Extension of dulness over the heart, resulting from liquid effusion.
4. Friction signs, attended with—or preceded by—valvular murmurs.
5. Signs of eccentric pressure analogous to those of empyema.
6. Signs of excitement of the heart.
7. Signs of weakness or paralysis of the heart.

ENDOCARDITIS.

Inflammation of the lining membrane of the cavities of the heart—endocarditis—occurs much more frequently in the left cavities than in the right, and affects the valvular apparatus more strikingly than the general tract of the membrane. The chief symptoms are, a sense of oppression and uneasiness at the præcordial region; fever; small, feeble, and intermittent pulse; great anxiety; cold sweats; oppressive dyspnœa; jactitation; and syncope. When the inflammation is only of limited extent, or when it assumes a chronic form, the symptoms are much milder and more obscure.

If we apply the hand to the chest in simple endocarditis, the action of the heart will appear to be very violent; sometimes a vibratory thrill will appear to be felt. Percussion often discovers an augmented extent of dulness in the præcordial region; this dulness may be distinguished from that caused by pericardial effusion, by the beat of the heart appearing superficial instead of remote and distinct. If we listen to the heart's action we shall detect a bellows-murmur, the most constant and characteristic of the phenomena of endocarditis. The murmurs of purely acute endocarditis are thus arranged in order of frequency by Dr. Walshe:—Aortic obstructive; mitral regurgitant; aortic regurgitant; aortic obstructive and mitral regurgitant together; aortic obstructive and regurgitant together. Pulmonary systolic and diastolic murmurs are infinitely rare. Dr. Walshe has never observed acute obstructive mitral murmur, nor acute regurgitant tricuspid murmur.[1]

Valvular Diseases of the Heart.—In exploring the diseases of the valves of the heart, whether resulting from endocarditis, or from the formation upon them of warty excrescences, or from the tearing of their tissues, or from their conversion into bone, assistance may be derived from remembering—in addition to the physical signs pointed out in the preceding chapter—the following principal physiological or functional symptoms which they often present to greater or less extent:

1. Difficulty of breathing, varying from the slightest dyspnœa to the most severe orthopnœa; much increased on ascending a height or making any exertion.

2. Palpitation and irregular action of the heart, with certain sounds and murmurs discoverable by auscultation, &c.

3. Irregular pulse. In mitral disease the pulse is generally soft and irregular; in aortic, hard, jerking, but regular.

4. Congestion of the lungs; bronchitis; pneumonia; pulmonary hemorrhage, with or without pulmonary apoplexy; these symptoms are most urgent in mitral disease.

5. Hemorrhages from the nose, bronchial tubes, or mucous membrane of the stomach.

6. Œdema of the lower and sometimes of the upper extremities, and face; hydrothorax; and ascites. Dropsy is more common in disease of the right cavities of the heart than in affections of the left.

8. Cephalalgia, tinnitus aurium, vertigo, syncope, cerebral congestion, and cerebral hemorrhage, most urgent in aortic disease.

[1] Op. cit. p. 611.

8. Broken rest, with startings during sleep, and frightful dreams.

9. Enlargement of the liver and spleen, with disorder of the digestive organs generally.

10. A peculiar appearance of the countenance, wherein the face is puffed, the cheeks flushed and of a purple hue, the lips congested and the eyes bright.

As regards *affections of the heart generally*, the diagnosis will be assisted by attention to the following points, many of which are well laid down by Dr. Spillan.[1]

The *causes* which have occasioned an affection of the heart may throw some light on its nature; as when either of the parents have labored under some particular heart disease we shall have reason to fear that the offspring will be affected with the same disease. With respect to *age* and *sex*, the affections of the heart during the early periods of life are generally attributable to inflammation and to congenital lesions, whilst in the aged they are due to fatty degeneration of the muscular fibres, to ossifications, or to pulmonary disease. In early life, and perhaps in women, the mitral valve and corresponding auriculo-ventricular orifice are most frequently diseased; in advanced life, and in men, the aortic. Young girls about the age of puberty, and anæmic women generally, are especially liable to palpitation and other temporary symptoms of cardiac disease without any organic lesion.

With regard to *form* of body, it has been noticed that robust persons, if they lead a sedentary life and live freely, are liable to certain symptoms of heart disease, which, though at first easily removed by bloodletting, purging, exercise, &c.; yet, if allowed to continue, ultimately lead to hypertrophy. A person who has a large abdomen, or an abdominal tumor, or who overloads his stomach, and so causes the viscera to be pressed upwards, thus diminishing the size of the thorax, may experience many of the symptoms of disease of the heart, without any organic change really existing.

Occupation has some influence in giving rise to cardiac affections; persons who make great muscular exertions, or who carry heavy loads, being especially predisposed.

The manner in which cardiac affections first set in may often throw some light on the diagnosis. Thus, if the attack be sudden, an acute affection may be the source of the evil. If there be at first rupture or distension of muscles, followed

[1] See Dr. Spillan's translation of Schill's "Pathological Semeiology," p. 93.

by acute pains in the region of the heart, we may suspect that the fleshy fibres are affected. If a rheumatic inflammation precedes or accompanies the attack, the pericardium, or, less probably, the endocardium, or even both, will be the seat of the disease. If pleurodynia with hæmoptysis has preceded the cardiac attack, the right side of the heart is affected in consequence of the pulmonary circulation being disturbed. Again, if the onset of the disease has been marked with slight symptoms, which have slowly and gradually increased, there is reason for apprehending the existence of some organic lesion, which will become more certain if the symptoms go on uninterruptedly, if they steadily increase in severity, and if they give rise to those general constitutional disturbances previously noticed.

Lastly, as regards the *seat* of the disease, it should be borne in mind, as I have already so strongly insisted on, that the left side of the heart is much more obnoxious to morbid changes than the right; and that when both sides are implicated, the alteration will be more decided in the left than in the right chambers. In nineteen cases out of twenty of valvular disease, the valves of the left ventricle—the mitral or aortic—will prove to be those affected; disease of the tricuspid valves guarding the right auriculo-ventricular orifice is rare, and of the semilunar valves of the pulmonary artery exceedingly uncommon.

ATROPHY OF THE HEART.

There are two forms of atrophy of the heart: one in which the organ simply wastes, and dwindles in all its parts; the other, in which the texture of the muscle suffers a sort of conversion into fat—becomes affected with fatty degeneration.

Fatty degeneration of the heart is a most interesting disease, for a full knowledge of which the student must refer to the writings of Drs. Quain and Ormerod, and Messrs. Paget and Barlow. It occurs under two circumstances; either alone, or in conjunction with fatty diseases of the other organs, as the kidneys, liver, cornea, &c. Its *diagnosis* is beset with difficulties, and when existing alone it is frequently not suspected until after death, and after a microscopic examination of some of the muscular fibres of the heart. The most prominent symptoms are feeble action of the heart, remarkably slow pulse—sometimes as low as fifty or forty-five, general debility, and a feeling of nervous exhaustion, loss of tone, &c.

It is not an uncommon cause of sudden death. "On opening a heart thus affected," says Dr. Ormerod, "the interior of the ventricles appears to be mottled over with buff-colored spots of a singular zigzag form. The same may be noticed beneath the pericardium also; and in extreme cases the same appearance is found, on section, to pervade the whole of the thickness of the walls of the ventricle and of the carneæ columnæ." On microscopically examining these spots, their nature is revealed; they are not deposits, but degenerated muscular fibres. Instead of seeing transverse striæ and nuclei, the evidences of a healthy state—little can be distinguished but a congeries of oil-globules. The muscular fibres are also found to be short and brittle; and Dr. Quain has pointed out that the coronary arteries are often obstructed. Mr. Paget well remarks that "the principal characters which all these cases seem to present is, that they who labor under this disease are fit enough for all the ordinary events of calm and quiet life, but are wholly unable to resist the storm of a sickness, an accident, or an operation."

HYPERTROPHY OF THE HEART.

The heart is stated roughly to be about the same size as the closed fist; its mean weight is between eight and nine ounces. The muscular walls of one or more of the cavities of the heart may become thickened without any diminution in the size of the chamber; this is called *simple hypertrophy*. Or, as most frequently happens, the walls may be thickened and the chamber become larger than natural; this is *eccentric hypertrophy*. On the other hand, the increase in thickness may be accompanied with diminution in the size of the cavity; this is known as *concentric hypertrophy*.

The *cause* of the hypertrophy is usually some obstruction either to the flow of blood through the heart, or to the free play of this organ; the *symptoms* are palpitation, dyspnœa, difficulty of walking quickly, uneasiness and pain in the cardiac region, headache, and frequent attacks of vertigo. If we listen to the heart's movements we shall merely find the systolic sound less distinct than in health; but we shall also feel that the extent of the pulsation beyond the præcordial region, and especially the degree of impulse against the walls of the chest, are both much increased.

Simple Hypertrophy of the Left Ventricle with no Obstruction to the Flow of Blood.—This condition is rare. On auscultting the heart the systolic sound is less loud and

clear than natural, but no bellows-murmur is heard. On placing the hand over the præcordial region the impulse of the heart will be found increased.

Hypertrophy of Left Ventricle with Valvular Disease.—A systolic bellows-murmur will generally be heard, and the heart's impulse will be much increased. The hypertrophy in this case is often an endeavor towards health, the increased power compensating for the obstruction to the flow of blood caused by the valvular disease.

CYANOSIS.

Cyanosis, morbus cæruleus, or blue disease, are terms applied to a condition characterized by blue or purplish discoloration of the skin, arising generally from some malformation of the heart, permitting direct communication between the right and left cavities.

The chief malformations are, permanence of the foramen ovale; abnormal apertures in some part of the septum of the auricles or of the ventricles; origin of the aorta and pulmonary artery from both ventricles simultaneously; extreme contraction of the pulmonary artery; or, lastly, continued patescence of the ductus arteriosus.

In addition to the discoloration of the skin, the patients who survive their birth suffer from coldness of the body, palpitation, fits of dyspnœa, or syncope on the least excitement, and dropsical effusions.

ANEURISM OF THE AORTA.

Three forms of aneurism are usually described; *true aneurism*, in which all the coats of the artery dilate and unite in forming the walls of the pouch; *false aneurism*, in which the inner and middle arterial tunics being ruptured, the walls are formed by the cellular coat and contiguous parts; and *mixed or consecutive false aneurism*, in which the three coats having at first dilated, the inner and middle ones subsequently rupture as the distension increases.

Aneurism of the Thoracic Aorta is chiefly met with in the ascending portion, or in the arch. Its *general symptoms* are very obscure, partly in consequence of their similarity to those arising from disease of the heart. When the aneurismal tumor is large and pulsating, and rises out of the chest, producing protrusion or absorption of the sternum and ribs, then the diagnosis is altogether as easy as it was before

difficult. When the sac presses upon the trachea, there will be dyspnœa; when on the recurrent laryngeal nerves, aphonia, and occasionally a mimicry of laryngitis; when on the œsophagus, dysphagia and symptoms of stricture; and when on the thoracic duct, inanition, and engorgement of the absorbent vessels and glands.

Aortic aneurism is sometimes accompanied by a bellows-sound, sometimes not. In false aneurism there is generally a murmur both with the entrance and exit of blood into the sac; or there may be one loud, prolonged, rasping bruit, from the passage of the blood over the roughened inner surface of the vessel. In true aneurism or mere dilatation of a part of the wall of the artery, murmurs are seldom audible. A small but free opening from the canal of the artery into the aneurismal sac, and a roughened state of the arterial tunics, from degeneration or from atheromatous deposit, are, however, two conditions which will give rise to a bruit. In both forms, when a murmur exists, a peculiar thrilling or purring tremor will be felt on applying the hand over the sternum.

Aneurism of the Abdominal Aorta often gives rise to acute pain in the lumbar region, occasionally shooting into either hypochondrium, and downwards into the thighs and scrotum; constipation aggravates the pain. By careful examination, a tumor may generally be felt, which communicates a constant and powerful pulsation to the hand. On applying the stethoscope, a short, loud, abrupt bellows-sound will be heard.

Aneurism of the Heart occurs in two forms; either there is simple dilatation of the wall of a ventricle, forming the improperly called *passive aneurism* of Corvisart; or a pouched fulness arises abruptly from the ventricle, constituting a tumor on the heart's surface. The sac often contains laminated coagula of blood, especially when its mouth is constricted.

The *symptoms* are uncertain and obscure. Death may result from rupture into the pericardium, or, if the pericardium be adherent to the heart—as it mostly is in these cases—into the pleura.

Aneurisms of the coronary arteries sometimes occur. I know of no signs on which the physician can rely for their detection.

CHAPTER IX.

ON THE DIAGNOSIS OF DISEASES OF THE SKIN.

It is a very generally entertained opinion that the diagnosis of cutaneous diseases is extremely difficult, that the treatment of these affections requires special study, and that the subject of cutaneous pathology should be viewed as a distinct branch of medicine. I believe that such ideas are very erroneous and mischievous; the various phenomena presented by each class of these disorders being generally very characteristic, always appreciable by the eye, and their treatment being by no means difficult, but often remarkably simple. Since, moreover, the majority of cutaneous affections are merely symptomatic of other diseases affecting different organs, I hold that no man can pretend to be a sound practitioner of medicine who is not fully acquainted with them all in their bearings.

In treating of the diagnosis of the various skin diseases I shall adopt the classification of Willan, as modified by Biett; which is, however, like the Linnæan classification of the vegetable kingdom, entirely artificial. I am of course conscious that in a work like the present only a faint outline of this important and interesting subject can be presented; and I therefore take the opportunity of referring those who wish to study the subject of cutaneous pathology thoroughly to the excellent translation of Cazenave's "Manual on Disease of the Skin," by Dr. Burgess, to which I am myself indebted for much very valuable information.

Willan's Classification, modified by Biett.

Order I. *Exanthemata.*—Erythema; erysipelas; roseola; rubeola; scarlatina; urticaria.

Order II. *Vesiculæ.*—Miliaria; varicella; eczema herpes; scabies.

Order III. *Bullæ*—Pemphigus; rupia; button scurvy.

Order IV. *Pustulæ.*—Variola; vaccinia; ecthyma; impetigo; acne; mentagra; porrigo; plica polonica; equinia or glanders.

Order V. *Papulæ.*—Lichen; prurigo.

Order VI. *Squamæ.* — Lepra; psoriasis; pityriasis; ichthyosis.

Order VII. *Tubercula.*—Elephantiasis Græcorum; molluscum; frambœsia.

Order VIII. *Maculæ.*—Colorationes:—Fuscedo cutis; ephelides; nævi. Decolorationes:—Albinismus; vitiligo.

Order IX. Lupus.

Order X. Pellagra.

Order XI. Malum Alepporum.

Order XII. Syphilidæ.

Order XIII. Purpura.

Order XIV. Elephantiasis Arabicum.

Order XV. Cheloidea.

ORDER 1. THE EXANTHEMATA.

The exanthemata consist of variously formed superficial reddish patches, varying in intensity and size, disappearing under pressure, and terminating in resolution or desquamation. They are frequently complicated with gastro-intestinal irritation or inflammation, and with cerebral, or pulmonary diseases. This order includes erythema, erysipelas, roseola, rubeola, scarlatina, and urticaria.

Erythema—is a non-contagious affection, characterized by slight superficial red patches, irregularly circumscribed, of variable form and extent, and most frequently seen on the face, chest, and extremities. Its duration varies from a week to a fortnight; it is seldom preceded or accompanied by febrile symptoms; it causes but slight heat, and no pain; and the prognosis is always favorable. The principal species of this disorder is known as *erythema nodosum*, in which the eruption is confined to the fore part of the leg, taking the form of one or more large oval patches, running parallel to the tibia, and rising into painful protuberances, much resembling nodes. It occurs commonly in young women when badly nourished or overworked.

Erysipelas,—called in Scotland the *rose*, in this country *St. Anthony's fire*, is an inflammatory affection of the skin, and very commonly of the areolar tissue, characterized by the affected part becoming of a deep red color, hot, painful, and swollen. No portion of the surface is exempt from attacks of it, but the integuments of the face and head are most commonly the seats of *idiopathic erysipelas*—that which arises from internal causes; while *traumatic* erysipelas—that which follows wounds—may occur on any part.

Idiopathic erysipelas resembles the other exanthemata, inasmuch as it is preceded by fever and general constitutional

disturbance. It often sets in with distinct rigors, and sore throat is an early and frequent accompaniment of it; disturbance of the cerebral functions, nausea, vomiting, and diarrhœa may also be present. Then, on the second or third morning from the rigor, redness and swelling appear on some part of the skin, frequently on one side of the nose, spreading to the rest of the face, and often extending over the scalp, neck, and shoulders. The lips swell, the cheeks enlarge, the eyes become closed by their puffy lids, and all traces of the natural features are completely lost. After three or four days the redness fades, the swelling subsides, and the cuticle desquamates. In most cases the inflammation is merely superficial; occasionally it affects the subcutaneous areolar tissue—phlegmonous erysipelas—and is then apt to be followed by suppuration and sloughing.

Erysipelas may prove fatal, by the extension of the inflammation to the brain or its membranes, giving rise to effusion and coma. The same result may occur from the mucous membrane of the glottis becoming affected, so that the chink gets closed, and the patient dies unexpectedly from suffocation. In other cases, death is owing to failure of the vital powers. Erysipelas may arise from infection or from contagion. When it prevails epidemically, as it sometimes does, intemperance, insufficient food, foul air, and trifling injuries favor its occurrence.

Roseola.—Roseola is a mild, non-contagious inflammation of the skin, characterized by transient patches of redness, of small size and irregular form, distributed over more or less of the surface of the body; its duration varies from twenty-four hours to six or seven days. The eruption, at first brightly red, gradually subsides into a deep roseate hue, and slowly disappears. It is accompanied by slight fever. There is one form of this affection which frequently affects adults, especially females, in the summer; it is called *roseola æstiva.*

Rubeola.—Rubeola (Willan), Morbilli (Sydenham), the Measles (Cullen), are terms employed synonymously to designate a disease, the distinguishing characters of which are a continued contagious fever, accompanied by an eruption, and frequently attended with inflammation of the mucous membrane of the respiratory organs.

The *symptoms* are lassitude, shivering, pyrexia, and catarrh; the conjunctivæ, Schneiderian membrane, and mucous membrane of the fauces, larynx, trachea, and bronchi are much affected. Swelling of the eyelids; eyes suffused and watery, and intolerant of light; sneezing; dry cough, with hoarseness

and severe dyspnœa; drowsiness; great heat of skin; frequent and hard pulse. The period of incubation—or, in other words, the time which elapses between the period of infection and the appearance of eruption—is from ten to fifteen days. Dr. Watson has known several instances in which it was exactly a fortnight. The eruption comes out on the fourth day of the disease, seldom earlier, often later; it consists of small circular dots, like flea-bites, which gradually coalesce into small blotches of a raspberry color; they present often a horse-shoe shape, and are slightly raised above the surface of the skin. The rash appears first on the forehead and face, and gradually extends downwards; it begins to fade on the seventh day in the same order, and is succeeded by slight desquamation of the cuticle, and great itching.

It is worthy of notice that the fever does not abate on the appearance of the eruption, as in small-pox, nor does the severity of the attack at all depend upon the quantity of the rash. The contagion of measles is strong. It is mostly seen in children; and, as a rule, occurs only once.

The prognosis must depend upon the mildness or severity of the chest symptoms; the complications most to be feared are croup, bronchitis, and pneumonia. The diarrhœa, which often sets in as the rash declines, is for the most part beneficial.

Scarlatina.—Scarlatina or scarlet fever is a contagious febrile disease, characterized by scarlet efflorescence of the skin and of the mucous membrane of the fauces and tonsils, commencing about the second day of the fever, and declining about the fifth; it is often accompanied by inflammation of the throat, and sometimes of the submaxillary glands. The time which elapses between infection and the period of the eruption varies from four to six days. Like measles, it is essentially a disease of childhood, but is more to be dreaded.

There are three varieties of this disorder. Scarlatina *simplex*, in which the skin only is affected; scarlatina *anginosa*, in which both skin and throat are implicated; and scarlatina *maligna*, in which all the force of the disease seems to be expended upon the throat.

Scarlatina simplex commences with slight fever, lassitude, and headache. The eruption appears on the second day about the neck, face, chest, and flexures of the joints, in the form of numberless vivid red points, which run together, form large irregular patches having the tint of a boiled lobster, and often almost cover the whole body in about twenty-four hours. The efflorescence commonly terminates by desquamation of the cuticle, which begins about the end of the fifth day on those

parts where the rash first appeared. On the face and trunk the desquamation is in the form of scurf, while on the hands and feet large flakes of cuticle are detached, so that sometimes a glove or slipper of scarf-skin comes away at once.

At the same time that the efflorescence has been spreading on the surface of the body, the mucous membrane of the mouth, fauces, and nostrils has also been affected. The tongue especially puts on an appearance characteristic of scarlatina. It is at first covered with a thick white fur, through which the red, elongated papillæ project; but as this fur clears away, it becomes clean and preternaturally red, and of a strawberry appearance. The affection of the mucous membrane of the mouth, &c., terminates by resolution; with the disappearance of the rash the febrile symptoms subside, and the disease ceases at the end of eight or nine days, leaving the patient very weak.

Scarlatina anginosa is ushered in with more violent symptoms than the preceding. There is headache, with some delirium, more pungent heat of the skin, and marked prostration. About the second day there is stiffness of the neck, uneasiness in the throat, hoarseness, and pain on swallowing. The fauces, palate, uvula, and tonsils are red and swollen, and the inflamed surfaces are covered with an exudation of coagulable lymph. As this inflammation goes on, all the febrile symptoms increase, and the skin becomes very dry and hot. The efflorescence does not observe the same regularity as in the simple form; it does not appear so early, is delayed to the third or fourth day, comes out in scattered patches on the chest and arms, and shows a tendency to vanish the day after its appearance, and to reappear partially at uncertain times. With the fading of the eruption, about the fifth or sixth day, the fever and inflammation of the throat begin to abate, although the throat often remains sore for a week or ten days after the disappearance of the rash. Occasionally this variety of scarlet fever assumes a more aggravated form, being accompanied with an acrid discharge from the nostrils and ears, deafness, and inflammation of the parotid and cervical glands—sometimes going on to suppuration.

During the progress of the disease particular attention should be paid to the internal organs, since there is a great predisposition to inflammation of the serous and mucous membranes.

Scarlatina maligna, described by Cullen under the title of *Cynanche maligna*, differs but little in its symptoms, at first, from scarlatina anginosa. The fever, however, soon assumes a malignant or typhoid character, great cerebral disturbance

being superadded to the affection of the fauces and skin. There is great irritability, restlessness, and delirium; the delirium being sometimes violent, but usually of the low muttering kind. The tongue is dry and brown, tender and chapped; the lips, teeth, and gums are covered with sordes; and the breath is extremely fetid. The throat is not much swollen, but appears of a dusky red hue, while the velum, uvula, and tonsils are covered with dark incrustations, consisting of exudations of lymph; in some cases there is gangrenous inflammation of these parts followed by sloughing. The cervical glands are often involved in the inflammation. The rash is exceedingly irregular as to the time of its appearance and duration, often coming out late, disappearing after a few hours, and being renewed several times during the progress of the disorder. It is at first of a pale hue, but soon becomes changed to a dark livid red: petechiæ also often appear upon the skin.

In many instances this malignant form of scarlet fever terminates fatally on the third or fourth day. It is always a disease of such extreme danger that only patients with vigorous constitutions survive it: great hopes may be entertained, however, if the seventh day be passed.

Sequelæ.—Children who have suffered from scarlatina are very liable to have their health permanently affected, and to become afflicted with some of the many forms of scrofula, especially strumous ulcers, ophthalmia, scrofulous enlargements of the cervical glands, diseases of the scalp, &c. But the most frequent and most serious sequel is *anasarca*—serous infiltration of the subcutaneous areolar tissue—often accompanied by dropsy of the larger serous cavities; it occurs about the twenty-second day from the commencement of the fever. Now it is curious that this scarlatinal dropsy is more frequent after a mild than after a severe attack, owing probably to the want of caution which is often observed in such cases during the period of desquamation. The patient gets exposed to cold, and immediately the escape of the fever-poison through the pores of the skin is checked, and, as a consequence, is directed to the kidneys in larger quantities than they can bear, giving rise to *acute desquamative nephritis*.[1] This renal affection has its origin from many causes (intemperance, cold, the cholera poison) besides the one we are considering, but however produced, its symptoms are the same. It commences usually with rigors or chilliness, followed by feverish reaction, headache, restlessness, pain and tenderness in the loins, and

[1] See Dr. George Johnson on Diseases of the Kidney.

often vomiting. The dropsy is an early symptom; the face first becomes puffy, followed by general swelling of the areolar tissue throughout the body, and by effusion of fluid into one or more of the serous cavities. At the same time there is a frequent desire to pass urine, which is scanty, of a dark smoky color, and on being tested by heat and nitric acid, is found to be highly albuminous. Examined microscopically, it is seen to contain masses of coagulated fibrin, blood-corpuscles, epithelial casts and cells, and occasionally crystals of lithic acid. The earliest sign of improvement is a disappearance of the dropsy and an increase in the quantity of urine secreted.

Urticaria.—Urticaria or nettle-rash is a non-contagious exanthematous eruption, characterized by long prominent patches or wheals, either red or white, of irregular shape, of uncertain duration, and accompanied by intense heat, a burning and tingling in the affected spots, and great itching.

There are two varieties: one in which it is acute, running a short, rapid course; another in which it is chronic, very obstinate, and either persistent or intermittent: both forms attack individuals of all ages and constitutions. The chronic intermittent variety is the *urticaria evanida* of Willan; it sometimes lasts for months, or even years.

Urticaria is caused by certain derangements of the digestive organs, arising from the use of particular articles of diet, such as shell-fish of different kinds, cucumbers, mushrooms, bitter almonds; certain medicines, as turpentine, balsam of copaiba, &c.

ORDER 2. VESICULÆ.

A vesicle is a slight elevation of the epidermis, containing a serous fluid—generally transparent, but occasionally opaque or sero-purulent. The fluid may be absorbed, or it may be effused upon the surface, causing excoriation and small thin incrustations. Vesicular eruptions are occasionally preceded by fever, but often appear imperceptibly; they give rise to a peculiar appearance, as if drops of water had been scattered over the surface of the skin. In this order we find miliaria, varicella, eczema, herpes, and scabies.

Miliaria.—Miliaria (sudamina, millet-seed rash, &c.) is characterized by an eruption of small vesicles, which spread over a large surface of the skin; it is often present in fever—especially in the latter stages—and in diseases affecting the serous membranes.

Many authors doubt the existence of miliaria as a distinct fever, attributing the eruption to the action of the skin under irritation, or any treatment producing copious sweating. This view would seem to be negatived, however, by the fact that the appearance of the vesicles is often attended by peculiar symptoms, such as constriction of the thorax, dyspnœa, great depression, and a tendency to fainting, which continue while the eruption lasts—for ten or twelve days.

Varicella.—Varicella, or variola spuria, or chicken-pox, is a trifling contagious complaint, almost peculiar to infants and young children, and occurring but once during life. It consists of an eruption of transparent vesicles, surrounded by a slight redness, commencing on the shoulders and breast, affecting the scalp, but often sparing the face, and remaining visible for five or eight days; the preceding and accompanying pyrexia is slight.

Eczema.—Eczema, crusta lactea, humid tetter, or scall, is a non-contagious disease, consisting of an eruption of small vesicles on various parts of the skin, closely crowded together, and often running into each other, so as to form, on being ruptured, superficial moist excoriations. There are several species of this disease. When the eruption consists of minute vesicles on different parts of the skin, without any inflammation, it is called *eczema simplex;* when the skin is inflamed, and there is heat and swelling, *eczema rubrum. Eczema impetiginodes* is a severe degree of eczema rubrum. When arising, as it sometimes does, from great heat, especially from the heat of the sun, it is called *eczema solare;* when as a result of the use of mercury, *eczema mercuriale.* In infants at the breast, and in children during dentition, it often affects the scalp—*eczema capitis.*

Herpes.—Herpes, or tetter, is a transient, non-contagious affection, consisting of clusters of vesicles upon inflamed patches of irregular size and form. The eruption runs a definite course, rarely continuing for more than two or three weeks; it is not usually severe, nor is it accompanied by any constitutional symptoms. Care must be taken not to mistake its nature, since *herpes præputialis* has been actively treated as syphilis, and *herpes circinatus*—when occurring on the scalp—as tinea tonsurans or ringworm. A singular species of this disease is known as *herpes zoster*, or *zona*, or the *shingles*, in which the inflamed patches with their clustered vesicles are arranged in the form of a band, encircling half the circumference of the body; in nineteen cases out of twenty the zone will be found to occupy the right side of the body.

Scabies.—Scabies, or psora, or the itch, is a contagious disease—contagious in that sense which implies contact—consisting of a vesicular eruption, presenting a number of watery heads, more or less distinct from each other, and attended with violent itching. It may attack every part of the body, with the exception of the head and face; it most frequently occurs in the flexures of the joints, especially on the fingers. The cause of the disease is an insect called the *Acarus scabici*, which is to be found about a line from, but not in, each vesicle.

ORDER 3. BULLÆ.

As a general rule, bullæ differ from vesiculæ merely in being larger, and hence it is almost unnecessary to separate them into two orders: they are small superficial tumors, caused by effusions of serum beneath the epidermis. Pemphigus and rupia are the two eruptions which come under this denomination, according to Willan; but Dr. Burgess has judiciously added button scurvy.

Pemphigus.—This affection is characterized by the appearance of large bullæ, two or three inches in diameter, upon one or more regions of the body. The eruption is generally preceded for twenty-four or forty-eight hours by slight general indisposition, fever, and itching of the skin; small red circular patches then form, gradually increase in extent, and become covered with bullæ, which either fade away on attaining their full size, or burst, and are replaced by thin brownish colored incrustations. The duration of this disease is usually from one to three weeks, although it occasionally becomes chronic and prolonged for months.

Pompholyx—is merely a variety of pemphigus, unattended with fever, and running its course in eight or ten days; it is very rare. A kind of artificial pompholyx may be produced by the application of cantharides. I have already referred to the case of a young woman in King's College Hospital who deceived her physician for a short time by rubbing powdered cantharides into various parts of her person, and thus raising numerous small blisters.

Rupia.—Rupia may be considered as a modification of pemphigus occurring in persons of debilitated constitutions, and in those whose systems have been contaminated with the poison of syphilis. It is characterized by the eruption of small flattened bullæ, containing at first serous fluid, which soon becomes purulent or sanguinolent, and concretes or dries into dark, black, rough crusts. When the crusts fall off, they leave

circular ulcers, of various sizes, indisposed to heal. The lower extremities are most frequently affected. Its duration varies from two or three weeks to several months.

Button Scurvy.—Ecphyma globulus, or button scurvy, as it is popularly misnamed, is a singular cutaneous disease prevalent in the middle and southern counties of Ireland. "This disease," says Dr. Burgess, "is characterized by an eruption of one or more scattered excrescences on different parts of the body, each of which in form resembles a convex button—hence its name—and varies in size from four or five-tenths of an inch to an inch and a quarter in diameter. It is highly contagious (through the medium of the fluid secreted by the excrescence), and is described by some writers, erroneously, as confined to the cuticle. It is not a syphilitic disease; although sometimes bearing a resemblance to the syphilitic condylomata described by Fricke."[1] It is ordinarily unattended by constitutional symptoms, and is merely a local affection, as is clearly proved by the ease with which the application of the nitrate of silver generally cures it.

ORDER 4. PUSTULÆ.

The pustular affections of the skin are characterized by the formation, between the cuticle and cutis vera, of small tumors containing purulent fluid, called pustules. The pustules are sometimes scattered irregularly, sometimes united in clusters; they are succeeded by scabs, and frequently by permanent cicatrices. The disease of this class are—variola, vaccinia, ecthyma, impetigo, acne, mentagra, porrigo, and equinia or glanders; to which I have added a disease but little known in this country—plica polonica.

Variola, or Small-pox.—This affection may be defined as a fever commencing with lassitude, headache, rigors, heat of skin, vomiting, and pain in the back; succeeded on the third day by an eruption of pimples, which in the course of a week inflame and suppurate. In many instances it is accompanied by a similar affection of the mucous membrane of the nose and mouth; in some, by swelling and inflammation of the subjacent cellular tissue; and occasionally by affection of the nervous system. When the vomiting and pain of the back are violent, they are generally the precursors of a severe form of the disease.

The period of incubation, or the time which elapses from

[1] Burgess's translation of Cazenave's "Manual on Skin Diseases." Second edition, p. 160.

the hour of infection to the establishment of the fever, is twelve days, during which the patient's health is apparently perfect. It is curious that, when the disease is received into the system by inoculation, only seven days elapse between the reception of the virus and the appearance of the fever.

The peculiar eruption of pimples or papulæ always begins to show itself on the third day of the fever, first appearing on the face, the neck and wrists, the trunk, and, lastly on the lower extremities. The papulæ then gradually ripen into pustules, the suppuration being complete by the eighth day, at which time the pustules break, and crusts or scabs form. In four or five days more these scabs are falling off.

The following table shows the period of incubation, time of the eruption appearing, and date of its disappearance in measles, scarlatina, and small-pox.

Disease.	Period of Incubation.	Eruption appears.	Eruption fades.
Measles.	10 to 15 days.	On 4th day of fever.	On 7th day of fever.
Scarlatina.	4 to 6 days.	On 2d day of fever.	On 5th day of fever.
Small-pox.	12 days.	On 3d day of fever.	Scabs form on 8th day, and fall off about 12th.

Now the severity of small-pox almost always bears a direct relation to the quantity of the eruption. When the pustules are few, they remain distinct and separate from each other; when very numerous they run together, coalesce, and lose their regularly circumscribed circular form. We thus have a division of this disease into two varieties—*variola discreta* and *variola confluens*. The former is seldom attended with danger; the latter is never free from it. The eruption on the face may be of the confluent form, while it is scanty elsewhere; still the disease is of the confluent kind. Sometimes the pustules are so numerous that they touch each other, but nevertheless do not coalesce; the disease has then been said to be of the *cohering* or *semiconfluent* form.

In *variola discreta*, the eruption, in the words of Willan, is papular. On the third day a small vesicle, with a central depression, appears on each papula, containing some thin transparent lymph; around this an inflamed areola forms. About the fifth day of the eruption, or the eighth of the disease, the vesicles lose their central depression, become turgid, and hemispheroidal. Suppuration has occurred, and the vesicles have become pustules, containing yellowish matter. A peculiar disagreeable odor now begins to emanate from the patient, which once smelt cannot be forgotten; from it alone

the disease may be diagnosed. About the eighth day a dark spot appears on the top of each pustule, the cuticle bursts, the matter oozes out, and the pustule dries into a scab. In about four or six days more the crusts fall off, leaving a purplish-red stain, which slowly fades; or where the pustule has gone so deep as to destroy a portion of the true skin, that permanent disfigurement, the so-called pitting or pock-mark results.

Variola Confluens is usually ushered in by more violent fever than is the discrete variety. The eruption comes out earlier; the eyelids swell, so that by the fifth day the patient is often unable to see; the parotid glands become affected; there is salivation also, and the limbs swell. The vesicles on the face run together into one bleb, containing a thin brownish ichor; face is pale and doughy. The vesicles on the trunk and extremities, though often not confluent, have no areola, and are pale. On the breaking of the pustules, large black or brown scabs are formed, exhaling great fetor: pulse rapid; great debility; and restlessness. The mucous membranes become involved; those of the nose, mouth, larynx, and trachea are the seat of an eruption; tongue and palate covered with vesicles; throat is very sore; there is difficulty of swallowing; hoarseness; dyspnœa; cough; the glottis often becomes narrowed, and suffocation may ensue. Delirium frequently occurs. When to the foregoing symptoms malignancy and putrescency are added, the disease becomes *malignant small-pox.*

But the greatest difference between variola discreta and variola confluens is in the *secondary fever;* which, slightly marked in the former, is intense and perilous in the latter. It sets in usually about the eleventh day of the disease, or the eighth of the eruption, and occasionally at once proves fatal, the system appearing to be overwhelmed by the virulence of the poison. During its course various troublesome complications may arise, such as erysipelas, swelling of the glands in the groin and axilla, phlebitis, pneumonia, &c.

Vaccinia, or Cow-pox.—Since the discovery of vaccination by Jenner, towards the close of the eighteenth century, the fatality of small-pox has been very much diminished. When vaccination has been successfully performed on a healthy child, an elevation may be felt over the puncture on the second day, accompanied by slight redness; on the fifth, a distinct vesicle is formed, having an elevated edge and depressed centre; on the eighth, it is of a pearly color, and is distended with a clear lymph. The vesicle is composed of a

number of cells, by the walls and floor of which the lymph is secreted. An inflamed ring or areola now begins to form round the base of the vesicle, and to increase during the two succeeding days; about the eleventh day it fades, and the vesicle, which has now burst and acquired a brown color, has by the end of the second week become converted into a hard, round scab. This falls off about the twenty-first day, leaving a circular, depressed, striated cicatrix, which is permanent in after life. The constitutional disturbance which accompanies vaccination is usually very slight. Some interesting experiments lately made by Dr. Gustav Wertheim, of Vienna, tend to show that the frequency of the pulse is permanently increased by the process of vaccination. Thus, a man aged thirty-eight, and a woman aged thirty-three, neither of whom had suffered from small-pox, were vaccinated for the first time; the pulse, in both cases, increased in frequency up to the sixth day after vaccination, when it began to decline; never declining—not at least for the four months during which the observations were continued—as low as it was before the introduction of the vaccine virus. For example, before vaccination, the man's pulse was on an average 66; afterwards the average was 78.

In practising vaccination, it is better to use recent lymph which should be taken from vesicles between the fifth and ninth days, the eighth being probably the best. If preferred, the virus may be taken direct from the cow. Dairy-women are often infected from milking cows with the eruption of vaccinia on their teats. When small-pox occurs after vaccination, as it sometimes will, the disease is much milder and shorter, and is unaccompanied by secondary fever; it is then called *modified* small-pox.

Ecthyma.—Ecthyma is an acute inflammation of the skin, characterized by large, round, prominent pustules, occurring upon any part of the body, though very rarely on the face or scalp. The pustules are usually distinct, seated upon a hard inflamed base, and terminate in red stains or in thick dark-colored scabs, which leave superficial ulcers, followed by cicatrices. This disease is often caused by stimulating applications to the skin, such as lime, salt, sugar, &c. Grocers and bricklayers are liable to it, especially when overworked, or when their systems are depressed by bad or insufficient food.

Impetigo.—Impetigo, or running-tetter, is a severe non-contagious inflammation of the skin, characterized by an eruption of small hemispheroidal or flattened pustules, most frequently grouped in clusters, and forming thick, rough, yel-

lowish scabs or incrustations. From beneath the incrustations a discharge takes place; the crusts become thicker and larger, and fall off, leaving a raw surface. The mode of distribution of the pustules has caused a division of the disease into two varieties—*impetigo figurata* and *impetigo sparsa*. The first occurs generally on the face, especially on the cheeks; it is attended with constitutional disturbance; and as the pustules burst and form scabs, the heat and itching become intolerable. In children the impetiginous eruption sometimes covers the face like a mask, and is called *crusta lactea*. The second form merely differs from the first, inasmuch as the pustules are more scattered, being sometimes distributed over an entire limb, or even over the whole body.

Acne.—Acne, or gutta rosacea, or coppernose, is a chronic pustular affection, characterized by small pustules with a deep red base, leaving behind small, hard, red tumors, the seat of which appears to be the sebaceous follicles of the skin. It appears most frequently between the ages of eighteen and forty, is often very chronic, and affects especially the temples, nose, cheeks, and forehead.

Mentagra.—Mentagra, or sycosis, or tinea sycosa, is characterized by inflammation of the hair-follicles, causing successive eruptions of small acuminated pustules, occuring most frequently upon the chin and other parts occupied by the beard; it rarely occurs upon the scalp, and rarely affects women. The disease is either due to, or—less probably—is attended by, the development of a microscopic parasitic plant—the *Microsporon mentagrophytes*.

Porrigo.—This is a very frequent variety of cutaneous disease, affecting especially the hairy scalp, but occasionally appearing on the forehead, temples, chin, and eyebrows. There are three species of porrigo, all of which are probably due to the development of parasitic plants.

Porrigo Favosa, or tinea favosa, most commonly affects the scalp in the form of a small, cup-shaped, dry, yellow crusts, each containing a hair in its centre, and somewhat resembling a piece of honey-comb—hence its name; it is contagious. The parasitic plant causing or accompanying it is the *Achorion Schönleineii*.

Porrigo Scutulata, or tinea tonsurans, or vulgarly ringworm, is a chronic contagious disease, known by the decolorization and brittleness of the hairs, the scaly eruption, and the roundness of the diseased patches. The parasitic plant is the *Trichophyton tonsurans*.

Porrigo Decalvans, or tinea decalvans, is readily diagnosed

by the perfectly smooth bald patches which result from the hair falling off on one or more circular spots, these spots varying in size from a sixpenny piece to five or six inches in circumference. The parasitic vegetable is *Microsporon Audouini*.

Plica Polonica.—Plica Poloniea, or trichosis plica, is a disease of the hair little known in this country. It is characterized by tenderness and inflammation of the scalp; the hairs become swollen and imperfectly formed; and the hair-follicles secrete a large quantity of viscid, reddish-colored fluid, which glues the hairs together, uniting them into a mass. It is caused or accompanied by two parasitic plants—the *Trichophyton tonsurans* and *Trichophyton sporuloides*.

Equinia, or Glanders.—Farcinoma, farey, or glanders, is attended by *symptoms* somewhat similar to those of glanders in the horse, viz., by fever, great debility, pains in the limbs, profuse offensive discharge from the nostrils, and the formation of a number of pustules and tumors in different parts of the body, which have a great tendency to suppurate and become gangrenous. The pustular eruption does not appear until about the twelfth day; it is accompanied by profuse fetid sweats, and sometimes by the formation of black bullæ. The disease generally proves fatal before the twentieth day. It occurs for the most part in grooms, stable-men, &c. There is abundant proof of the transmission of the glanders from the horse to man.

ORDER 5. PAPULÆ.

A papula or pimple is a small, solid, acuminated elevation of the cuticle, resembling an enlarged papilla of the skin, generally terminating in resolution or in slight desquamation, and sometimes in ulceration of its summit. Papular eruptions are usually preceded by itching; are rarely accompanied by fever; slowly developed; not contagious; developed on any part of the body; and varying in their duration from a week to several months. Lichen and prurigo are the diseases of this class.

Lichen.—This is a papular affection readily recognized by the minute, hard, red elevations of the skin which it presents, together with the annoying pruritus. There are three forms.

Lichen simplex, in which the eruption consists of small agglomerated papulæ, rarely larger than a millet-seed.

Lichen strophulus, or red-gum, tooth-rash, &c., which generally attacks infants at the breast, and is characterized by an eruption of minute, hard, sometimes slightly red pimples, attended with itching, and appearing upon part or the whole surface of the body.

And *Lichen agrius*, in which the papulæ are more inflamed and developed on an erythematous surface, which appears hot and painfully distended. The itching is very intense, and the duration of this form is often very prolonged.

Prurigo.—Prurigo—itching—is a cutaneous disease characterized by an eruption of small papulæ or pimples, of the natural color of the skin. It is a chronic affection, lasting for months or years, and causing great discomfort, not to say misery. Patients afflicted with it scratch and tear themselves constantly till the blood flows; their sufferings are aggravated by warmth. Willan describes three varieties,—*prurigo mitis*, *prurigo formicans*, and *prurigo senilis*. The first is the mildest form; in the second the itching is combined with a sensation like the creeping of ants or the stinging of insects; while the third occurs in old persons, and is the most obstinate, often continuing for the rest of the patient's life. In the diagnosis of prurigo care must be taken not to confound it with the itching which arises from the presence of pediculi.

ORDER 6. SQUAMÆ.

The term squamæ is applied to the scales of degenerated, thickened, dry epidermis, which cover minute papular elevations of the skin; they are readily detached, and are reproduced by successive desquamations for a long time. The scales or scurf are the result of a morbid secretion of the epidermis; their formation gives rise to but slight constitutional disturbance, and to mere local heat and itching: none of the squamous diseases are contagious, but they are very chronic in their duration. Lepra, psoriasis, pityriasis, and ichthyosis, are the diseases included in this order.

Lepra.—Lepra, or lepra vulgaris, is perhaps the most obstinate and troublesome of all cutaneous diseases. It is a non-contagious chronic eruption, consisting of red, scaly, circular patches, of various dimensions, scattered over different parts of the body, but more frequently found in the neighborhood of the joints, especially near the knee and elbow. By degrees, the patches increase in size and number, and extend along the extremities to the trunk.

When the patches are small, white, and of long standing, the disease is termed *lepra alphoides;* when copper-colored, and the result of syphilis, *syphilitic lepra.*

Psoriasis.—Psoriasis, psora leprosa, or dry tetter, is a chronic non-contagious inflammation of the derma, characterized by the development of patches of various extent and

form, slightly raised above the level of the skin, covered by thin, whitish scales of altered epiderma, and accompanied by rhagades or fissures of the skin. The eruption may be local, or it may be diffused over the whole body. The *local* varieties consist of psoriasis palpebrarum, psoriasis labialis, psoriasis præputialis, psoriasis scrotalis, psoriasis palmaris, and psoriasis unguinum. The general varieties are psoriasis vulgaris, psoriasis gyrata, and psoriasis inveterata.

Psoriasis is closely allied to lepra in its appearance, and general pathology; in the former disease, the patches are irregular, and not depressed in the centre; in the latter they are circular, and depressed in the centre, with elevated margins.

Pityriasis.—Pityriasis is a chronic inflammation of the skin, attended with redness and itching, and characterized by the production of minute white scales or scurf in great quantity. It may attack any region, but the scalp and parts covered with hair are the most common seats of it. The desquamation takes place copiously and incessantly. It is often very rebellious to treatment.

Pityriasis versicolor, or chloasma, or liver spot, makes its appearance generally on the front of the chest or abdomen in the form of small spots of a dull reddish color, which gradually increase in size, and assume a yellow tint. It may last from a few days to many months or years. It is contagious. According to Eichstedt, this disease is caused by a cryptogamic plant—*Microsporon furfur*.

Ichthyosis.—Ichthyosis, the fish-skin disease, is characterized by the development, upon one or more parts of the integuments, of thick, hard, dry, imbricated scales of a dirty gray color, resting upon an uninflamed surface, and unattended by heat, pain, or itching. It is said to be a congenital disease, and to last during life.

ORDER 7. TUBERCULA.

The diseases belonging to this order—Elephantiasis Græcorum, molluscum, and framboesia—are characterized by small hard tumors or tubercles, more or less prominent, circumscribed in form, and persistent; they may become ulcerated at the summit, or they may terminate in suppuration. Tubercular diseases are slowly developed, are very chronic, are almost peculiar to tropical regions, and their symptoms are so characteristic that their diagnosis is easy.

Elephantiasis Græcorum.—This terrible and dangerous

disease, non-contagious, hereditary, and generally incurable, is characterized by the appearance of patches of a purplish color, succeeded by elevated tumors, having the same tint, irregular in shape and size, soft, smooth, and insensible to the touch, and which generally—after a certain time—become the seat of unhealthy ulceration. It is not met with in temperate climates, but there is found to be a disposition to it as we approach the polar regions on the one hand, and the tropics on the other. Males suffer from it more than females. It is designated by the Jews *tsaraäth*.

Molluscum.—This affection—so called from the similarity of the tubercles characterizing it to the eminences growing on the bark of the maple tree—consists in the presence of small tumors, varying in size from a pea to a pigeon's egg, sometimes of a brown color, and sometimes growing from a broad base, and sometimes from a narrow peduncle. There are two forms—one contagious, the other not. Contagious molluscum is a very rare, severe, and chronic affection: Bateman saw two cases only. Non-contagious molluscum is less severe, and does not produce as much irritation as the opposite kind; after a time the tumors neither grow nor alter, but remain stationary for life.

Frambœsia.—Frambœsia, or pian, or yaws—in Guinea, is rarely met with in Europe, but is common in Africa, America, and the West Indies. Without any precursory symptoms, parts of the skin—especially about the face, scalp, axillæ, or genital organs—become covered with small dusky-red spots, which gradually become converted into larger tubercles, isolated at their summits, but collected together at their bases, and often resembling raspberries or mulberries in their color and form. The tubercles are generally hard, covered with dry scales, and are sometimes inflamed; if the inflammation spreads, ulceration sets in, and a yellow sanious discharge results, which forms scabs around the tumors. The disease continues for years, or even for life.

ORDER 8. MACULÆ.

This order of cutaneous diseases is characterized by certain changes of color in parts of the skin—giving rise to spots of various appearance and size—or in the whole of the cutaneous envelop. The maculæ are seated in the rete mucosum, and depend on some alteration of its coloring matter; they are generally incurable, and unattended by any derangement of health; and they may be divided into two classes, those

attended by *change* of color, and those marked by *absence* of color.

Changes of Color.—The skin sometimes becomes of a bronze or slate color, as may occur—either—after a long-continued use of nitrate of silver, or naturally, without any appreciable cause. The change is generally permanent.

Lentigo, or *Freckles*, or *Sunburn*, is generally congenital; the spots mostly cover the parts of the body exposed to light. Freckles are more common in the fair than the dark-complexioned; are sometimes excited by the sun, and are most common in warm countries.

Ephelides are yellow irregular spots, which sometimes appear temporarily on the chest, abdomen, and groins, from errors in diet, &c.

Nævi, or *Mother-marks*, or *Moles*, are either small congenital discolorations of the skin, or they consist of vascular spots of variable size, formed by a congeries of bloodvessels.

Loss of Color.—The absence of the coloring matter of the skin may be congenital or accidental.

In *Albinismus* the skin is of a dull white, milky color; the body is covered with a woolly white down, and the eyebrows, eyelashes, and hairs generally are smooth, silky, and white. The iris is of a rose color, and the pupils present a deep red appearance, owing to the absence of pigment in the choroid uvea. The albino is generally weak-minded, and of a delicate constitution; he is found amongst all the races of mankind.

When the skin is the seat of a partial discoloration, congenital or accidental, the affection is known as *vitiligo*. The discoloration may appear on any part of the body in the form of smooth, milky-white colored patches; when it occurs on the scalp it causes baldness. It may occur at all ages, and it generally lasts for years.

ORDER 9.

Lupus.—The only disease in this order is lupus, a most formidable affection. Dr. Burgess, in his translation of Cazenave, says that it commences with purple and red spots, or more frequently with livid indolent tubercles, the chief character of which is their tendency to end in destructive ulceration of the surrounding parts. There are two varieties of this disease, *lupus non exedens*, and *lupus exedens* or *noli me tangere*. In the *first* there is no ulceration, yet the tubercles leave deep cicatrized pits behind them; when it spreads rapidly and superficially, it leaves the skin crossed by white scar-like ridges

and bands. The *second* is very destructive; it attacks the nose more frequently than any other region of the body, though why it does so is unknown. The extent of parts which it destroys varies; sometimes the whole nose being eaten away, sometimes only the point.

ORDER 10.

Pellagra.—This is a peculiar disease very common in Lombardy, in which the skin becomes wrinkled, and assumes —in those parts exposed to the air—a scaly appearance. The strength diminishes, the digestive organs are deranged, the spirits are generally depressed, the intellectual faculties and sensations become obscure, and cramps and convulsions often supervene. In addition, chronic pulmonary affections often supervene and contribute to the fatal result. It is often hereditary, non-contagious, incurable, may occur at any age, and is supposed to be caused by confinement and isolation, by bad food, and by the habitual use of Indian corn.

ORDER 11.

Malum Alepporum.—This is a peculiar disease, consisting in the eruption of one or more tubercles, followed by a permanent cicatrix; it occurs generally in the face; is not very formidable, its greatest inconvenience being the unsightly scar: and it occasionally prevails endemically in towns on the banks of the Tigris and Euphrates, and especially at Aleppo.

ORDER 12.

Syphilida.—Syphilis is a very grave, contagious disease, of modern origin, dating probably from the close of the fifteenth century, consisting of an ulcer, termed "the primary symptoms," produced in that part of the skin or mucous membrane to which the poison has been directly applied; the ulcer is frequently followed or accompanied by bubo—specific enlargement or suppuration of the lymphatic glands—usually those of the groin. Gonorrhœa and syphilis are essentially distinct affections; the former never gives rise to "secondary symptoms," the latter frequently does, and always—according to Ricord—when the primary sore has consisted of an indurated chancre; the matter of gonorrhœa will never produce a specific venereal ulcer. These secondary symptons consist of inflammation of the skin, of the palate, of the throat, of the eye, of the bones, of the periosteum, of the joints, and the formation of warty growths; they manifest themselves usually

from six weeks to six months after the cure of the primary sore, although three or four years may elapse between the two affections. Secondary syphilitic cutaneous eruptions are generally of a copper color, scaly, have a tendency to run into chronic ulceration, occur most frequently in the face, forehead, back, and shoulders, and according to most authorities are non-contagious; secondary symptoms may, however, be transmitted from the parent to the offspring. "Tertiary symptoms" are not uncommon, consisting generally of inflammatory affections of the mucous membrane of the fauces, and of disease of the bones. The duration of syphilis varies according to the severity and treatment of the primary symptoms, and the nature of the secondary affections: it may last from a few days to many years.

ORDER 13.

Purpura.—Purpura consists of a morbid condition of the capillaries, owing to which blood is effused into the different tissues of the body, the effusion giving rise to the formation of sanguineous patches of various size. When the patches are small—mere spots—they are termed *petechiæ;* when large, *ecchymoses.*

The spots vary in color, being either red, purple, livid, or reddish brown; they bear a great resemblance to bruises; pressure does not efface them. Five varieties are usually enumerated, namely, purpura simplex, purpura urticans, purpura hemorrhagica, purpura senilis, and purpura cachectica. This disease must not be confounded with scurvy, which it somewhat resembles. It differs, however, inasmuch as it often appears suddenly, is not attended by a livid, spongy state of the gums, and is not owing to any want of vegetable food.

ORDER 14.

Elephantiasis Arabicum.—This affection is characterized by great swelling and induration of the skin and of the subjacent areolar and adipose tissues, producing marked deformity. It frequently attacks one of the lower extremities, causing great swelling, so that the limb becomes double its natural size, hardness, severe pain, and an appearance resembling—it is fancifully said—the leg of an elephant. It is uncommon in Europe, occurring principally in the West Indies; it generally continues for life; causes alarming constitutional disturbance; is neither contagious nor hereditary; and attacks males and females, rich and poor indiscriminately.

ORDER 15.

Cheloidea.—Cheloidea, or keloide, or cancroide, was first described by Alibert under the above names, owing to the disease presenting a flattish raised patch of integument resembling the shell of a tortoise. It forms small, flat, painful tumors, one or two inches in diameter, raised a few lines above the level of the skin, having irregular forms, slight depressions in their centres, and being covered with wrinkled epidermis. Sometimes there is only one tumor, sometimes several; the disease is developed slowly, rarely ends in ulceration, often disappears spontaneously merely leaving a cicatrix, is usually found on the chest between the mammæ, and is very uncommon.

CHAPTER X.

PARASITIC WORMS FOUND IN THE HUMAN BODY.

In considering the parasitic worms of the human body it is necessary to divide them into two classes—according as they occupy internal or external tissues—and then to subdivide them according to the textures they severally inhabit. Thus we have,

1. *Internal Parasitic Worms.*

Brain,	Acephalocystis multifida.
Eye,	Filaria oculi.
	Cysticercus cellulosæ.
Liver,	Acephalocystis endogena, or pill-box hydatid.
	Echinococcus hominis.
Gall-bladder,	Distoma hepaticum, or liver-fluke.
Spleen and Omentum,	Echinococcus hominis.
Kidney,	Strongylus gigas.
	Polystoma pinguicola.
Ovary,	Diplosoma crenata.
Urinary Bladder,	Ascaris lumbricoides, or round-worm.
Small Intestines,	Tænia solium, or common tape-worm.
	Bothriocephalus latus, or broad tape-worm.
Large Intestines,	Tricocephalus dispar, or long thread-worm.
	Ascaris vermicularis, or common thread-worm.
Areolar Tissue,	Filaria Medinensis, or Guinea-worm.
Muscular Tissue,	Trichina spiralis.
	Cysticercus cellulosæ.
Bronchial Glands,	Filaria bronchialis.

2. *External Parasitic Worms.*

Skin,	Pulex penetrans, or chigoe.
	Acarus scabici.
Hair-follicles,	Acarus folliculorum.
Surface of the Body,	Pediculus corporis.
Hair of the Head,	Pediculus capitis.
Hair of the Pubes,	Pediculus pubis.
Eyelashes,	Pediculus ciliorum.

I. INTERNAL PARASITIC WORMS.

Acephalocysts or Hydatids.—These peculiar parasites are met with in different parts of the body, but especially in the liver, brain, spleen, and omentum.

Hydatic tumors occur in the liver more frequently than in any other organ. They consist of a sac, lined by a thin bladder or cyst, and filled with a limpid colorless fluid, floating in which numerous small cysts, similar to the cyst lining the sac, and varying in size from a pea to a pigeon's egg, are usually found. To these cysts or bladders Laennec gave the name acephalocyst—a bladder without a head. The acephalocyst lining the sac is composed of finely laminated friable coats, about the firmness of coagulated albumen. Sometimes it contains no floating hydatids, or very few; in other cases it is literally crammed with them; and these again, it is said, may contain another generation. To distinguish these different kinds, as well as to mark the mode of their increase, naturalists have divided these productions into two species: 1st, the *acephalocystis endogena* of Kuhn, likewise called *socialis, vel prolifera* by Cruveilhier, the *pill-box hydatid* of Hunter, which is the kind most commonly developed in the human subject, and in which the fissiparous process of generation takes place usually from the internal surface of the parent cyst, the progeny being sometimes successively included; and, 2d, the *acephalocystis exogena* of Kuhn, *eremita vel sterilis* of Cruveilhier, which develops its progeny generally from the external surface, and is found in the ox and other domestic animals. The true nature of these acephalocysts has long been a subject of investigation. M. Livois seems, however, to have settled the question by his discovery that they are the dwelling-place of those minute animalcules to which Rudolphi gave the name *echinococcus*, from the cylinder of hooks surrounding the head. M. Livois states that echinococci exist in all acephalocysts, and this observation has been in a great measure confirmed by Dr. Budd and other observers. When an acephalocyst is opened, its inner surface is seen to be studded with numerous white opaque particles, which are found by the microscope to be distinct echinococci.

The *echinococcus hominis* is a transparent, colorless, oval-shaped animalcule, displaying an apparatus of suctorial prominences and hooklets at the cephalic extremity, and measuring about the one two-hundredth of an inch in length, and rather less in breadth. In structure the animal is a mere integument, one half—the head and neck—being susceptible of retraction into the other half. The head is a flat disk at the extremity of the neck, having imbedded in its substance an apparatus of small hooks, thirty-four in number, disposed in a circle. Immediately behind the head are four rounded suctorial processes, beyond which follows the body, while at the extremity of this is a short peduncle by which the animal attaches itself to the wall of the acephalocyst. When the animal is viewed with its head retracted within its body, the circle of hooks is seen through the transparent integument appearing like a ring in the centre of the body.[1]

When a hydatid tumor forms in the liver, its growth is generally slow. It gives rise to little inconvenience beyond a sensation of weight, so that its presence is often not suspected until found after death. When the tumor is of a large size, it may then be easily felt; sometimes it compresses the portal vein or vena cava, causing ascites and œdema of the legs. It may burst into the peritoneum—causing fatal peritonitis, or into the lung, or into the intestines, or through the abdominal wall; in the two latter cases, the contents will often be entirely discharged, and the sac ultimately closing up, will leave the patient well. When the tumor opens into the lung, the sufferer becomes so worn out with the constant expectoration of hydatids and puriform matter, and the constitutional disturbance is so severe, that he generally sinks under it.

Sometimes a hydatid tumor gets well without opening, namely, by the secretion of a thick putty-like matter within its sac, owing either to the destruction, or at all events causing, the destruction of the hydatids.

The Filaria Oculi, Filaria Medinensis, and Filaria Bronchialis.—These various filariæ are small, hollow, cylindrical worms, possessing a distinct alimentary canal, a mouth and anus separate, and organs of generation placed on separate individuals. The filaria oculi was detected by Nordman in the liquor Morgagni of the capsule of the crystalline lens of a man who had been operated upon for cataract; it was curled up in the form of a ring, and measured three-fourths of a line

[1] Erasmus Wilson on the Echinococcus Hominis: Med. Chir. Trans. vol. xxviii.

in length. A larger species is found in the eye of the horse. It gives rise to no symptoms.

The filaria medinensis, or Guinea-worm, has its residence in the subcutaneous areolar tissue, and generally in that of the feet, though it may occur in any superficial situation. It is a long, slender, uniformly shaped worm, resembling a fiddle-string, varying in length from six inches to eight or even twelve feet, and being about one line in thickness. It appears to be endemic in the tropical regions of Asia and Africa. The symptoms of its presence are great uneasiness and itching, and ultimately suppuration.

The filaria bronchialis is a slender worm about an inch in length. It was detected by Treutler in an enlarged bronchial gland of a patient who died from phthisis.

The Cysticercus Cellulosæ.—This parasite is for the most part found in subjects of the leucophlegmatic temperament, but it is not common. It has been met with in the muscles—especially the glutei and extensors of the thigh, in the muscular tissue of the heart, and in the brain and eye. It is generally surrounded by an adventitious capsule formed of the neighboring tissue condensed by inflammation; it consists of a head, neck, and dilated cyst-like body, and varies in length from a quarter to three-quarters of an inch. It is very commonly found in the hog, giving rise to that state of the muscles known as "measly pork."

The Distomata.—The distoma hepaticum, or fluke, or liver fluke, is found in the gall-bladder and ducts of the liver of a variety of quadrupeds, and especially in the sheep in connection with the disease called "the rot." When it occurs in man it is generally developed in the same situation. In form it is flattened, ovate, and elongated: its under surface presents three pores, the anterior being the mouth, the middle being for the purpose of generation, and the posterior for adhesion or locomotion; and it is of a light brown color. The flukes give rise to no characteristic symptoms.

A second species of distoma was described by Rudolphi as the distoma lanceolatum; it is only the young, however, of the distoma hepaticum.[1]

The Polystoma Pinguicola was discovered by Treutler in the cavity of a mass of tubercle in the left ovarium of a young woman who died in labor. It is about three-quarters of an inch in length, truncated towards the head, and pointed towards the other extremity.

The Strongylus Gigas—sometimes occupies the human

[1] Article *Entozoa*, by Professor Owen; Cyclopædia of Anatomy and Physiology.

kidney. It is the largest of the parasitic worms, varying in length from five inches to a yard, and being sometimes half an inch in diameter. The male is smaller than the female.

This worm causes great suffering; there are no symptoms of its presence that can be relied upon. It has been passed by the urethra, and the patient recovered.

The Dactylius Aculeatus—was first described by Mr. Curling, who discovered several of them in the urine of a little girl recovering from fever. The worm is of a light color, cylindrical, and about four-fifths of an inch long. The male is smaller than the female.

The Diplosoma Crenata—varies in length from four to six or eight inches, is solid throughout, without any trace of internal organization, and of a yellow-white color. A patient of Mr. Lawrence's voided numbers of these parasites for a length of time from the urinary bladder; they were probably contained in a cyst which was ruptured by passing a catheter.[1]

The Spiroptera Hominis.—This worm was first discovered in the urine of Mr. Lawrence's patient just alluded to. Rudolphi examined some specimens which were forwarded to him, and found them to be of different sexes—the female ten lines in length, the male about eight—of a white color, slender, and very elastic.

The Trichina Spiralis.—This microscopic entozoon exceeds in minuteness of form and in numbers every other parasite of the human body; its seat is the muscular tissue. The worm exists coiled up in minute elliptical cysts, which are readily examined by the microscope with a half-inch object-glass. When extracted from its habitation this parasite is found to measure about one-thirtieth of an inch in length, and about one seven-hundredth of an inch in diameter. It is cylindrical and filiform, and possesses an alimentary canal; when found in the muscles, it is generally in those that are superficial, where it exists in immense numbers. No cause has been suggested for their presence, neither do they give rise to any symptoms which could lead to the supposition of their existence during life.

Entozoa found in the Intestinal Canal.—There are five entozoa—ἐντος, within, and ζωον, an animal—occasionally found inhabiting the intestinal canal, of which three possess an alimentary tube, and are therefore called hollow worms, or *Cœlelmintha*—κοῖλος, hollow, and ἕλμις, a worm—and two which have no abdominal cavity, and are hence termed solid

[1] Medico-Chirurgical Transactions, vol. ii.

worms, or *Sterelmintha*—στερεὸς, solid, and ἕλμινς. Such of the parasites as I have already described are also arranged by some authors under one or other of these heads, but the distinction with them is of secondary importance.

In the first class we have,

1. *The Tricocephalus Dispar*, or long thread-worm, usually found in the cœcum and large intestines, measuring about two inches in length, and having a very slender body. It is often found in considerable numbers, even in the intestines of healthy persons; during life they give rise to no symptoms.

2. *The Ascaris Lumbricoides*, or large round-worm, is found in the small intestines, especially of ill-fed children. It somewhat resembles in size the common earth-worm, varies in length from six to nine inches, and is of a light yellow color. The symptoms which it gives rise to are thirst, disturbed sleep with grinding of the teeth, pallid countenance, fœtid breath, swelled belly, emaciated extremities, depraved appetite, slimy stools, itching of the nose, tenesmus, and itching of the anus.

3. *The Ascaris Vermicularis*, or small thread-worm, is found in the rectum, and is the smallest of the intestinal worms, averaging usually about a quarter of an inch in length. It gives rise to intolerable itching and irritation about the anus, tenesmus, depraved appetite, picking of the nose, depraved breath, and disturbed sleep.

In the second class we find,

1. *The Tænia Solium*, or common tape-worm of this country, which exists in the small intestines, varying in length from five to ten feet, and in breadth from one line—at its narrowest part—to four or five at its central or broadest portion. The head of this parasite is small and flattened, having in its centre a projecting papilla armed with a double circle of hooks, around which are four suckers or mouths, by which nourishment is imbibed; the generative apparatus consists of a ramified canal or ovarium containing the ova, and occupying the centre of each joint. The symptoms of its presence are not very striking, its existence being generally unsuspected until single joints are passed in the stools; in many cases, however, there is a continual craving for food, debility, pain in the stomach, emaciation, and itching about the nose and anus.

2. *The Bothriocephalus Latus*, or broad tape-worm is almost peculiar to the inhabitants of Switzerland, Russia, and Poland. It differs from the common tape-worm in having its segments of a greater breadth than length. The extreme fertility of

the *bothriocephalus latus* may be understood by considering that each foot of the well-developed worm contains 150 segments or joints, each joint possessing its own ovary and male organs. Hence each joint is fertile, and as each ovary would produce 8000 ova, it may be calculated that ten feet of such a worm would produce 12,000,000 of ova. They are very rarely met with in this country, but they are so occasionally. Professor Owen, examining the collection of a worm doctor in Long Acre, found three specimens; two had come from persons who had been in Switzerland, but of the third nothing was known.

2. EXTERNAL PARASITIC WORMS.

The Pulex Penetrans, or Chigoe.—This small insect is found in America and the Antilles; it penetrates the epidermis, and there lodges its eggs to about the number of sixty, which, when hatched, create great irritation, and often serious mischief. The native inhabitants extract them very skilfully with a needle, taking care not to rupture the cyst in which they are inclosed.

The Acarus Scabiei.—This little parasite, belonging to the class *Arachnida* (spiders) of articulated animals, is now generally admitted to be the cause of that loathsome, contagious disease of the skin—scabies. It is generally found about a line from, but not in, each vesicle.

M. Bourguignon's researches on the nature and habits of the acarus scabiei show that the male is but one-third of the size of the female; that he is the most nimble of the two, being very lively when the body is warm; and that he is the least frequently met with. He has suckers on two of his hind feet, and genital organs on the surface of the abdomen. The female burrows into the epidermis, and lays four eggs at intervals of about four days between each deposit, shifting her position in the meantime until sixteen eggs are inserted beneath the skin. In ten days the shells are broken, and the insects make their appearance as six-legged larvæ, increase rapidly in size for a few days, then shed the shell—like the crustacea—and acquire eight legs, when they are perfectly developed, and capable of tormenting man and reproducing their species. The males and young females do not burrow into the epidermis as the pregnant females do, but run about on the surface, puncturing the skin merely for blood-globules and serum, on which they live.

The Acarus Folliculorum.—The acarus folliculorum, or

the steatozoon folliculorum,[1] was discovered by Dr. Simon, of Berlin, in the sebaceous substance with which the hair-follicles —especially those on the face—are commonly filled. It is very minute in size, measuring little more than a quarter of a line in length, and being undistinguishable by the naked eye; it is divisible into a head, thorax, and abdomen, and resembles in form and shape the common caterpillar. This animalcule is found in numbers varying from one to twenty in the sebaceous follicles or oil-tubes of the skin in the majority of mankind, and always when any disposition exists to the unnatural accumulation of sebaceous matter: the skin at the same time is apparently healthy. They may be obtained by compressing the skin until the sebaceous matter is squeezed out: a microscope magnifying 250 diameters will detect them. Mr. Erasmus Wilson regards these steatozoons as performing a beneficent purpose in the economy of the skin, that purpose being the disintegration of the over-distended cells, and the stimulation of the tubes to perform their office more efficiently.

Pediculi.—The human body is infested with four different species of the pediculus, or louse—of which the *pediculus capitis*, or louse of the head, is the most common; next, the *pediculis pubis*, or crab-louse, which attaches itself to the hair about the pubes and anus; the *pediculus corporis*, or body louse, often found in the clothes; and, lastly, the *pediculus ciliorum*, or louse of the eyelash, which is very rare.

CHAPTER XI.

ON THE CHEMICAL AND MICROSCOPICAL EXAMINATION OF THE BLOOD, EXPECTORATION, VOMITED MATTERS, AND URINE.

It was my original intention to devote this chapter to a full consideration of all the secretions and excretions of the human body; but want of space compels me to limit myself to the examination of the blood, sputa, vomited matters, and urine. I may, however, observe that the chief excretions consist of the watery vapor and carbonic acid exhaled by the lungs; the sweat, excreted by the skin, consisting chiefly of watery vapor, lactic acid, a small quantity of carbonic acid, a little oily matter, and a small proportion of the same animal and saline matters as are contained in the blood; the excretions from the bowels,

[1] Wilson, on "Diseases of the Skin," p. 466.

including the bile; and, lastly, the most complex of all the excretions—the urine. The retention of any of these excretions in the body is most injurious, and often fatal, since the peculiar matters characterizing them are not formed from the blood, but actually separated from it, at the parts where they appear; allow, therefore, these excrementitious matters to accumulate in the circulating fluid, and general constitutional disturbance must result. This is well seen when the principles of the bile remain unseparated from the blood, owing to defective secretion on the part of the liver, and jaundice results; or, to take another example, when, owing to severe renal disease, the urea, instead of being removed by the kidneys from the circulating fluid, accumulates in it, and actually poisons the sufferer.

SECTION 1. THE BLOOD.

The general appearance of the blood is familiar to every one: it is slightly alkaline; has a faint odor; a saline disagreeable taste; and a higher specific gravity than any other animal fluid—averaging 1050 or 1055.

When circulating in the vessels, blood is composed of a nearly colorless, transparent liquid—the liquor sanguinis—in which numberless minute disk-shaped bodies or corpuscles are suspended or floating. The liquor sanguinis consists of water, fibrin, serum holding albumen in solution, certain extractive and fatty matters, and fixed saline matters. The blood-corpuscles—usually forming about 130 parts in every 1000 of healthy blood—are of two kinds; the *red corpuscles*, by far the most numerous, to which the red color of the blood is due, about the $\frac{1}{3\,0\,0\,0}$th of an inch in diameter, consist of membranous vesicles filled with red fluid, which fluid is composed of coloring matter containing iron—termed hæmatin, and of a protein compound, somewhat analogous to albumen, called globulin; and the *white corpuscles*, somewhat larger than the red ones, about the $\frac{1}{2\,5\,0\,0}$th of an inch in diameter, irregular in form, slightly granular on the surface, and apparently identical with the peculiar corpuscles found in the lymph and chyle.

On removing blood from the vessels, and allowing it to repose for a short time, it coagulates—that is to say, the liquor sanguinis separates into two portions: the colored clot or crassamentum—consisting of the fibrin and blood-corpuscles,—and the fluid portion, consisting of the serum holding the albuminous and saline matters in solution. The formation of the clot is owing to the solidification of the fibrin, which, while becoming solid, entangles the red and white

blood-corpuscles in its meshes. In certain states of the system, when the fibrin coagulates more slowly, or when the corpuscles sink more rapidly than in healthy blood, the upper surface of the clot will be colorless, presenting an appearance known as "the buffy coat," which was formerly thought to be indicative of inflammation. Occasionally this buffy coat, when the blood is rich in fibrin, is depressed in its centre, and the blood is then said to be "cupped and buffed."

Chemical Composition of Human Blood.—To make a complete quantitative analysis of the blood, including the separation from each other and estimation of all the ingredients, is a complicated and difficult task, and requires the person undertaking it to be a good chemist. Such an analysis is, however, quite unnecessary for clinical purposes, although it is as well that the result of such an examination should be roughly remembered. I shall therefore quote the following table by Dumas:

Analysis of Healthy Venous Blood.

130 Clot,	Fibrin,		3
	Globules,	Hæmatin,	2
		Globulin,	125
870 Serum,	Water,		790
	Albumen,		70
	Oxygen, Nitrogen, Carbonic acid,		
	Extractive matter, Phosphorised fat, Cholesterin, Serolin, Oleic and margaric acids, Chlorides of sodium and potassium, Muriate of ammonia, Carbonates of soda, lime, and magnesia, Phosphates of soda, lime, and magnesia, Sulphate of potash, Lactate of soda,		10
	Salts of the fatty acids,		
1000	Yellow coloring matter,		1000

Arterial Blood merely differs from venous in containing less solid matter, less albumen, less salts, and in being of a bright scarlet color, which latter is probably due to the influence of the oxygen of the air. In anæmia and chlorosis the water is sometimes increased to 900 parts in 1000, and the globules diminished even to as low as 21 in 1000. In fever the globules have been known to amount to 185 in 1000; while in

many inflammatory diseases the quantity of fibrin appears to be increased. In diabetes, sugar may usually be detected in the blood; while in jaundice the presence of bile may be demonstrated.

Microscopic Examination of the Blood.—If a drop of blood be placed under the microscope, and examined with a quarter of an inch object glass, the red globules will be seen as a multitude of pale, red, round, bi-concave disks having a tendency to turn upon their edges, and to arrange themselves in rolls like rouleaux of coins; a very few white corpuscles, irregular in form, granular on the surface, and rather larger than the red globules will also be readily distinguished. Long maceration in serum or in water will frequently cause the red globules to diminish to half their size in bulk, and to present a perfectly spherical slightly colored body. Strong acetic acid dissolves them rapidly. Acetic acid renders the external cell-wall of the colorless corpuscles very transparent, and also brings the nucleus into view, consisting of one or two round granules. In leucocythemia—as described by Dr. Hughes Bennett—the colorless corpuscles become much increased in quantity, so that, instead of two or three being seen in the field of the microscope at the same time, some thirty, forty, or more become visible.

To Examine Stains of Blood.—To discover whether a certain stain consists of blood, it must be moistened with some fluid having a specific gravity of 1040 or 1050—white of egg will answer very well—scraped off the material holding it, and examined microscopically with a quarter of an inch object-glass; blood-corpuscles will be rendered distinctly visible if the stain consists of blood.

Dr. Garrod's Plan of ascertaining the presence of an Abnormal Quantity of Uric Acid in the Serum of the Blood.—From the researches of Dr. Garrod, I entertain but little doubt that the presence of an abnormal quantity of uric acid in the blood—such a quantity as is capable of being demonstrated—is a pathognomonic sign of gout; and that, consequently, where the diagnosis rests between gout and rheumatism, the presence or absence of this acid from the circulating fluid will decide the question.

Take from one to two fluid drachms of the serum of the blood, and put it into a flattened glass dish or capsule; to this add the strong acetic acid of the London Pharmacopœia, in the proportion of about six minims to each fluid-drachm of the serum. A few bubbles of gas are generally evolved at first; but when the fluids are well mixed, two or three fine

threads, or one or two ultimate fibres from a piece of unwashed huckaback, are to be introduced. The glass is then to be put aside in a moderately warm place—as on the mantelpiece in a room of ordinary temperature—until the serum is quite set and almost dry, the time required varying from eighteen to forty-eight hours. If the cotton fibres be then removed and examined microscopically with an inch object-glass, they will be found covered with crystals of uric acid, if this agent be present in abnormal quantity in the serum. The crystals form on the thread, somewhat like the crystals of sugar-candy on string.

When it is undesirable to remove even a few drachms of blood, we may examine the fluid effused by the application of a blister, since the uric-acid thread experiment may be as readily employed for the discovery of uric acid in blister-serum as in blood-serum. It is only necessary to observe the precautions alluded to in examining the blood-serum, and also to be careful not to apply the blister to an inflamed part, since the existence of inflammation appears to have the power of preventing the appearance of uric acid in the effused serum.[1]

SECTION 2. THE EXPECTORATION.

The character of the expectoration often furnishes us with instructive signs. The basis of all kinds of expectoration is the natural secretion of the mucous membrane of the air-tubes, which is a transparent, colorless, glutinous liquid, consisting chiefly of water, mucus, and saline matter. In simple catarrh the natural secretion is merely increased in quantity; in bronchitis the sputa are often glairy—like white of egg—and streaked with blood; in hæmoptysis the expectoration may consist entirely of blood; in phthisis, purulent fluid and portions of softened tubercle are expectorated, occasionally with cretaceous or calcareous masses of phosphate and carbonate of lime; while in pneumonia, at the outset, there is merely expectoration of bronchial mucus, but in two or three days the sputa assume a very characteristic appearance, being transparent, tawny or rust-colored, and united into a jelly-like mass of great viscidity.

To examine the sputa microscopically, they should be thrown into water, when the lighter portions will float on the surface, while the more dense sink. These latter can be broken up, and small particles placed on a glass slide for examination. The matters usually found consist of epithelium, portions of food—as muscular fibre, oil-globules, starch granules, &c.—

[1] Medico Chirurgical Transactions, vol. xxxvii, p. 51.

and occasionally of vegetable fungi, which are often present about the fauces. In phthisis, a number of small, round, oval, or triangular-shaped bodies—*tubercle corpuscles*—are frequently found, containing granules in their interior, and mingled with granular matter. Occasionally fine molecular fibres, which have been separated from the areolar and elastic tissue of the air-cells of the lung, are also seen, showing that ulceration or sloughing of the pulmonary texture is going on. Schroeder van der Kolk states that these fragments may be found before the physical signs of ulceration of the lungs are well marked; but Dr. Hughes Bennett—a great authority on this subject—disputes the assertion, though he allows that in doubtful cases, especially where—from chronic pleurisy or pneumonia—there is dulness on percussion, whilst the other physical signs are more or less obscure, the presence of these fragments will confirm a previous suspicion of existing phthisis.[1] In pneumonia, fibrinous casts of the minute bronchi may often be observed, sometimes infiltrated with pus-corpuscles. And, lastly, the dirty green or black inspissated sputum, so commonly expectorated in the morning by residents in cities, consists of mucus and epithelial cells containing carbon, probably derived from the smoky atmosphere.

SECTION 3. VOMITED MATTERS.

But little attention has been paid to the microscopic examination of these matters, and but little therefore is known of them. The chief substances found are epithelium, starch-granules, torulæ and other varieties of vegetable fungi—resembling the yeast plant, vibriones, and sarcinæ.

The *Sarcinæ Ventriculi*—first described by Goodsir—consist of square bundles, divided by vertical and horizontal lines into four parts, and each having a resemblance to a woolpack—whence its name; they are seen either singly or aggregated into masses. These vegetable parasites are found in the vomit when it is very acid, and when it resembles yeast in appearance.

Dr. Todd has found the sarcinæ in ulceration and enlargement of the stomach with contraction of the pylorus, and he suggests that these vegetable organisms result from the long detention of food in the stomach. There is but little doubt that this explanation is correct; but it is also probable that the intensely acid fluid in which the sarcinæ are found may itself irritate and close the pylorus spasmodically; in such cases consequently, if we check the formation of these growths we shall cure the disease.

[1] Op. cit. p. 92.

Sarcinæ have also been found in the urine, fæces, and in the fluid of the ventricles of the brain.

SECTION 4. THE URINE.

Healthy human urine is a limpid, pale, amber-colored fluid, free from any deposit, of acid reaction, unaffected by heat, nitric acid, liquor potassæ, &c., and having an average specific gravity of 1018. Dr. Prout estimates the normal quantity of urine secreted in the twenty-four hours to be from thirty ounces in the summer, to forty in the winter. A distinction is usually drawn between the *urina potus*, or that passed shortly after taking fluids; the *urina chyli*, or that evacuated soon after the digestion of a full meal; and the *urina sanguinis*, or that which is voided on first awaking in the morning, and which may generally be taken as a fair specimen of the renal secretion. The solid matters in the urine may be said to consist of urea, uric acid, hippuric acid, vesical mucus and epithelium, ammoniacal salts, fixed alkaline salts, earthy salts, and animal extractive.

Solid Contents.—To estimate the solid contents as well as the weight of an ounce of urine, of any specific gravity between 1010 and 1040, the late Dr. Golding Bird constructed the following very useful table:

Specific Gravity.	Weight of one fluid ounce.	Solids in one ounce.	Specific Gravity.	Weight of one fluid ounce.	Solids in one ounce.
		Grains.			Grains.
1010	441·8	10·283	1025	448·4	26·119
1011	442·3	11·336	1026	448·8	27·188
1012	442·7	12·377	1027	449·3	28·265
1013	443·1	13·421	1028	449·7	29·338
1014	443·6	14·470	1029	450·1	30·413
1015	444·	15·517	1030	450·6	31·496
1016	444·5	16·570	1031	451·	32·575
1017	444·9	17·622	1032	451·5	33·663
1018	445·3	18·671	1033	451·9	35·746
1019	445·8	19·735	1034	452·3	36·831
1020	446·2	20·792	1035	452·8	37·925
1021	446·6	21·852	1036	453·2	38·014
1022	447·1	22·918	1037	453·6	39·104
1023	447·5	23·981	1038	454·1	40·206
1024	448·	25·051	1039	454·5	41·300

Clinical Examination of Urine.—On making a clinical examination of the urine, we should first ascertain the quantity passed in the twenty-four hours; its acidity or alkalinity, by the use of litmus and turmeric papers; its specific gravity, by means of the urinometer; and its behavior on the application of heat, nitric acid, and liquor potassæ. To examine it microscopically, a portion should be placed in a conical glass, and allowed to stand for some hours; a few drops of the deposit at the bottom of the glass are then to be placed by means of a pipette on a glass slide, and covered with thin glass. Crystals of uric acid, deposits of urate of soda, and deposits of phosphates, will be readily distinguished with a good half-inch achromatic object-glass; oxalate of lime, carbonate of lime, cystine, blood-corpuscles, casts of tubes, pus, mucus, epithelium, and certain fungi, as torulæ, &c., will require a quarter-inch object-glass; while spermatozoa and vibriones can only be distinctly examined with the one-eighth of an inch glass.

An Increased Flow of Urine, or diuresis, may be temporary, and merely dependent on the large quantities of fluid taken; or it may be permanent for a time and associated with disease, as it very constantly is in diabetes, and in those states of the system connected with a peculiar state of nervous irritability—as hysteria, &c.

A Deficiency of Urine may also be the temporary result of abstinence from fluids, unusual cutaneous activity, &c.; or it may be permanently associated with certain constitutional and local affections, as with inflammatory states of the system generally.

Reaction of the Urine to Litmus and Turmeric Test-papers.—In many diseases—as gout, rheumatic fever, &c.—we find the urine *unusually acid*, which may be owing to an excess of acid, or it may be caused by the presence of oxalic acid. On the other hand, this secretion may be *alkaline*, though it is very doubtful if the urine is ever so secreted. It generally happens thus:—a patient is unable completely to empty his bladder, and therefore, after each attempt to do so, a small quantity of urine is left which soon becomes alkaline; this suffices to contaminate the acid urine as it drops *guttatim* from the ureters. Of course, as a rule, the vital endowments of the bladder are sufficient to preserve its contents from undergoing that change which so readily takes place out of the body, viz., decomposition. But this preservative power depends upon the integrity of the spinal nerves and branches from the organic system supplying this viscus; if, therefore,

any injury be inflicted upon these nerves, directly or indirectly, the result will be diminution of vital power, and the urine will undergo certain changes, as it would out of the body. One of these changes is the union of urea with the elements of water, and the formation of carbonate of ammonia. Ammoniacal urine inflames the mucous membrane of the bladder, and gives rise to the secretion of mucus of a viscid character; the mucus becomes puriform when the alkaline urine has kept up the inflammation for a certain time.

Urine Depositing Uric Acid—is very acid; of a reddish-brown color; generally of a specific gravity above 1020; and on cooling deposits crystals of uric acid, resembling a yellow crystalline sand. This deposit does not dissolve on the application of heat; but if—as often happens—the urine contains an excess of urates, this excess will be dissolved, and hence the crystals of uric acid will become more distinct. Nitric acid dissolves the deposit, while hydrochloric and acetic acids have no action; heated with liquor potassæ, the uric-acid crystals dissolve, from the formation of urate of potass, which is readily soluble in alkaline fluid. Examined microscopically, large rhomboidal crystals are seen; occasionally lozenge-shaped and square crystals are present.

Urine containing an Excess of Urea—may be known by its high specific gravity—1020 to 1030—and by crystals of nitrate of urea forming on adding nitric acid to a portion of the urine in a test-tube. If the urea be only slightly in excess, the urine should be concentrated, by evaporation to about one-third its bulk, before adding the acid.

Urine containing an Excess of Urate (or Lithate) of Lime, Soda, &c., will be distinguished by its high color, increased density, and turbid appearance when cold—somewhat resembling pea-soup. On applying heat with a spirit-lamp, it immediately becomes bright and clear. Examined by the microscope, an abundant amorphous precipitate is seen.

These deposits were formerly regarded as consisting of lithate of ammonia. It has, however, been lately shown that they have a variable constitution, being made up of urates of lime, potash, soda, with only very small quantities of ammonia. Even this last is probably derived from the decomposition of urea.

Urine containing an Excess of Ammoniacal and Fixed Alkaline Salts—is generally of a pale color, and rather low specific gravity. On the application of heat, a deposit is produced resembling albumen, from which it is distinguished, however, by its being dissolved on the addition of a few drops

of nitric acid. Sometimes, when the quantity of albumen present is small, the cloudiness produced by heat will be dissolved by a drop or two of nitric acid, but will reappear on continuing to add more of this agent; but the phosphatic cloud remains permanently dissolved. Liquor potassæ and liquor ammoniæ also produce deposits of phosphates. Examined with the microscope, crystals presenting the form of triangular prisms, sometimes truncated, at others having terminal facets, are readily distinguished; occasionally they present a star-like or foliaceous appearance.

Urine containing Purpurine.—Purpurine never occurs as a deposit unless the urates are in excess, when it gives them a beautiful tint, varying from a pale flesh color to a deep carmine. The presence of an excess of purpurine appears to depend on some imperfection in the excretion of carbon by the organs destined to eliminate this element from the blood, as the liver and lungs.

Cystine.—This substance never occurs in healthy urine, and rarely in diseased; it has been found especially in the renal secretion of scrofulous patients. It forms a fawn-colored deposit, somewhat resembling the urates, but which is unchanged by heat, and slowly dissolves on the addition of nitric or hydrochloric acid; it is readily soluble in liquor ammoniæ. A greasy-looking pellicle, consisting of crystals of cystine and ammonio-phosphate of magnesia, soon forms on cystic urine. When a few drops of ammoniacal solution of cystine are allowed to evaporate spontaneously on a piece of glass, crystals in the form of six-sided laminæ will be seen by the microscope; they are probably short hexagonal prisms.

Oxalate of Lime.—Oxalate of lime is often present in the urine, and is a constituent of one of the most annoying forms of calculi. The urine is generally of a fine dark amber hue, of a specific gravity varying from 1015 to 1025, natural in quantity, and free from any precipitate—unless there be also an excess of urates. Examined by the microscope, crystals, in the form of transparent octahedra with sharply-defined edges and angles will be detected; if the light be bright, these crystals generally resemble cubes marked with a cross. Very rarely, the crystals are shaped like dumb-bells, or like two kidneys with their concavities opposed. Dr. Golding Bird was of opinion, however, that these crystals consisted of oxalurate of lime, a salt differing from oxalate of lime in ultimate constitution only in the presence of the elements of urea and absence of the constituents of water.[1]

[1] Urinary Deposits, fourth edition, p. 219.

Gravel in the Urine.—When a patient discharges gritty powder, or sand, or small calculi, with the urine, he is commonly said to have "a fit of the gravel." The most common forms of gravel are the urates of lime, potash, and soda, with a small quantity of ammonia, often called lithate or urate of ammonia. Next in frequency we find lithic or uric acid, or red sand; then a deposit, consisting mainly of the triple phosphate of ammonia and magnesia, mixed with amorphous phosphate of lime; next, a deposit of oxalate of lime; and, lastly, one of cystic oxide. Urinary calculi are composed of either urate of lime and potash, &c.; or of uric acid; cystic oxide; carbonate of lime; oxalate of lime; triple phosphate of ammonia and magnesia; phosphate of lime; or of silica.

Mode of Testing for Albumen in the Urine.—Two tests must be employed—heat and nitric acid. On applying heat—the most delicate of the two tests—to albuminous urine in a clean test-tube, the albumen coagulates and produces a cloud varying in density. This only happens, however, when the urine is acid; alkaline urine may be loaded with albumen, yet heat will produce no deposit. In such a case the urine must be rendered acid by the addition of a drop or two of acetic or nitric acid, and heat then applied. So, also, urine containing an excess of earthy phosphates, as mentioned in the preceding paragraph, will become cloudy on the application of heat; for this reason therefore we employ nitric acid, which dissolves the phosphates, but renders the albuminous deposit permanent. Nitric acid alone will coagulate albuminous urine, but it must not be trusted to, since it also often produces a whitish amorphous precipitate of uric acid, when the urine contains a large quantity of urates; this precipitate, which might be mistaken for albumen, is distinguished by its not being produced by heat.

When, therefore, we obtain a deposit by both heat and acetic or nitric acid, we may be sure that it consists of albumen.

Mode of Testing Purulent Urine.—On adding liquor potassa to urine containing pus, it is rendered viscid, so that the mixture can hardly be poured from one test-tube to another. By the microscope numerous globular corpuscles, about the $\frac{1}{100}$th of an inch in diameter, with smooth margins and granular surfaces, are seen floating in the liquor puris; each corpuscle generally contains one or more round or oval nuclei. On adding strong acetic acid, the cell-wall is dissolved and the nuclei liberated.

Urine containing Sugar.—Diabetic sugar differs from

cane-sugar; it has the same chemical composition as that contained in most kinds of fruit, commonly known as grape-sugar, or glucose.

Diabetes can hardly be called a disease of the kidneys, since in it the sugar is likewise found in the blood and in the fæces. From the researches of Bernard we learn that the blood from the hepatic vein always contains sugar; that it is the result of the digestion of food, for if an animal be starved it disappears; it is found also independently of the nature of the aliment taken. Section of both pneumogastric nerves, as well as any violent shock to the nervous system, destroys the power of the liver to form sugar. Irritation of the root of the pneumogastrics in the fourth ventricle of the brain increases the formation of sugar, and causes it so to abound in the blood that it is secreted with the urine—in short, artificial diabetes is produced. When the respiratory function is violently stimulated, sugar appears in the urine; or when ether or chloroform is given, a temporary diabetes is often produced.

Diabetic urine has a sweetish taste and odor, is generally of a pale color, is secreted in very large quantity—sometimes forty, fifty, or more ounces—and is of a high specific gravity, varying from 1025 to 1050; the worse the disorder, the higher will be the specific gravity. It was at one time thought that torulæ were developed only in saccharine urine; Dr. Bence Jones and others have proved the incorrectness of this view, and taught us that though often formed in acid diabetic urine, yet that they are not peculiar to it, being especially frequent in acid albuminous urine, or even in healthy acid urine after exposure to the air. Dr. Hassall[1] has also shown that the so-called torulæ are identical with the Penicilium glaucum, the fungus which imparts the mildewed appearance so common to decaying vegetable and animal substances. Dr. Hassall has succeeded in proving, however, that a distinct species of microscopic fungus, identical with the yeast plant, is developed in saccharine urine, and in this urine only, when it is acid, is freely exposed to the air, and is kept at a moderate temperature. The presence of this sugar-fungus indicates the vinous fermentation, its development being accompanied by the disengagement of carbonic acid and the formation of alcohol. The Penicilium glaucum and the yeast-fungus not unfrequently exist together in diabetic urine; but the latter—it must be remembered—is alone peculiar to it, and may be found when the quantity of sugar is too small for detection by the potash and copper tests.

[1] Medico-Chirurgical Transactions, vol. xxxvi.

Several tests have been proposed for the detection of sugar in urine.

Moore's Test.—Add to the suspected urine, in a test-tube, about half its volume of liquor potassæ, and boil the mixture gently for a few minutes. If sugar be present, the liquid will assume a dark brown tint. If, on the contrary, the urine be healthy, it will only be very slightly darkened.

Care must be taken—as Dr. Owen Rees has pointed out—that the liquor potassæ does not contain lead, as it often will if it has been kept in a white glass bottle. When it does so, the sulphur in the urine produces a dark color with the lead, which might lead to an incorrect diagnosis. The test-solution should be kept in a green glass bottle, free from lead.

Fermentation Test.—Mix a few drops of fresh yeast, or a little of the dried German yeast, with the suspected urine, and then fill the test-tube with the mixture. Put some of the urine also into a saucer, and then invert the tube and stand it upright in this vessel, taking care that the tube is full and free from bubbles of air; set aside in a warm place, having a temperature of 70° F., for twenty-four hours. If sugar be present, it begins very shortly to undergo the vinous fermentation, by which it becomes converted into carbonic acid and alcohol; which change will be recognized by the bubbles of carbonic acid causing gentle effervescence, and afterwards collecting in the upper part of the tube. If the urine is free from sugar, no gas will be formed.

Trommer's Test.—A little of the suspected urine is to be placed in a test-tube, and a drop or two of a solution of sulphate of copper added, so as to give the mixture a slight blue tint. A solution of potash is now added, in quantity equal to about half the volume of urine employed; this will throw down a pale blue precipitate of hydrated oxide of copper, which, if there be any sugar, will immediately redissolve, forming a purplish-blue solution. We must then cautiously warm the whole over a spirit-lamp, without boiling it; when, if sugar be present, a yellowish-brown precipitate of sub-oxide of copper will be deposited. If there is no sugar, a black precipitate of the common oxide of copper will be thrown down. This test is very delicate, and will detect very small quantities of sugar.

Kiestein.—This is a peculiar principle said to exist in the urine of pregnant women, and to become visible—when the secretion is allowed to repose in a cylindrical glass—in the form of a cotton-like cloud, which, after four or five days, becomes resolved into a number of minute opaque bodies, which

rise to the surface and form a fat-like scum, remaining permanent for three or four days. In these cases, the urine has a peculiar cheesy odor, and remains faintly acid until the scum or pellicle breaks up. Dr. Kane says that, in eighty-five cases of pregnancy, he obtained a well-marked pellicle in sixty-eight, a modified but recognizable one in eleven, while six gave no pellicle.[1] I may mention that I have failed to obtain it when the urine contained an excess of lithates. It has been found before the second period of suspended menstruation. Its presence is undoubtedly connected with the lacteal secretion, for when the lacteal elements are secreted without a free discharge at the mammæ, it may be found. Dr. Kane remarked that it continued in the urine for a short time after labor, until the mother began to suckle freely. Of ten women, eight exhibited it at the period of weaning. I entertain a high opinion of the importance of keistein, as diagnostic of pregnancy, having repeatedly tested its value; still I should hardly rely upon it alone.

Casts of Tubes, Epithelium, Blood-globules, &c.—On examining the urine microscopically in acute and chronic desquamative nephritis, in fatty degeneration of the kidney, &c., numerous fibrinous casts of the uriniferous tubes are seen, occasionally containing large quantities of oil-globules. So, numerous blood-corpuscles and epithelial scales are found in the same diseases, which latter, in fatty degeneration of the kidney, are often loaded with oil-globules. In most of these cases the urine will also be albuminous.

Bile in the Urine.—The coloring matter of the bile, when it exists in the urine, is readily detected, by the dark yellow color it gives to the secretion, by the yellow color it communicates to a piece of white linen dipped in it, or by the dark green and afterwards purple color which the urine assumes when a sufficient quantity of sulphuric acid is added to it in a test-tube, or on a white plate.

Iodide of Potassium in the Urine—may be detected by adding, first, starch to the cold secretion, and then a few drops of nitric acid (or solution of chlorine); the blue iodide of starch will be formed, if an iodide be present.

[1] American Journal of Medical Science, July, 1842.

CODE OF ETHICS

OF THE

AMERICAN MEDICAL ASSOCIATION,

ADOPTED MAY, 1847.

OF THE DUTIES OF PHYSICIANS TO THEIR PATIENTS AND OF THE OBLIGATIONS OF PATIENTS TO THEIR PHYSICIANS.

Art. I.—Duties of physicians to their patients.

§ 1. A physician should not only be ever ready to obey the calls of the sick, but his mind ought also to be imbued with the greatness of his mission, and the responsibility he habitually incurs in its discharge. Those obligations are the more deep and enduring, because there is no tribunal other than his own conscience to adjudge penalties for carelessness or neglect. Physicians should, therefore, minister to the sick with due impressions of the importance of their office; reflecting that the ease, the health, and the lives of those committed to their charge, depend on their skill, attention, and fidelity. They should study, also, in their deportment, so to unite *tenderness* with *firmness* and *condescension* with *authority*, as to inspire the minds of their patients with gratitude, respect, and confidence.

§ 2. Every case committed to the charge of a physician should be treated with attention, steadiness, and humanity. Reasonable indulgence should be granted to the mental imbecility and caprices of the sick. Secrecy and delicacy, when required by peculiar circumstances, should be strictly observed; and the familiar and confidential intercourse to which physicians are admitted in their professional visits, should be used with discretion, and with the most scrupulous regard to fidelity and honor. The

obligation of secrecy extends beyond the period of professional services;—none of the privacies of personal and domestic life, no infirmity of disposition or flaw of character observed during professional attendance, should ever be divulged by the physician, except when he is imperatively required to do so. The force and necessity of this obligation are indeed so great, that professional men have, under certain circumstances, been protected in their observance of secrecy by courts of justice.

§ 3. Frequent visits to the sick are, in general, requisite, since they enable the physician to arrive at a more perfect knowledge of the disease—to meet promptly every change which may occur, and also tend to preserve the confidence of the patient. But unnecessary visits are to be avoided, as they give useless anxiety to the patient, tend to diminish the authority of the physician, and render him liable to be suspected of interested motives.

§ 4. A physician should not be forward to make gloomy prognostications, because they savor of empiricism, by magnifying the importance of his services in the treatment or cure of the disease. But he should not fail, on proper occasions, to give to the friends of the patient timely notice of danger when it really occurs; and even to the patient himself, if absolutely necessary. This office, however, is so peculiarly alarming when executed by him, that it ought to be declined whenever it can be assigned to any other person of sufficient judgment and delicacy. For, the physician should be the minister of hope and comfort to the sick; that, by such cordials to the drooping spirit, he may smooth the bed of death, revive expiring life, and counteract the depressing influence of those maladies which often disturb the tranquillity of the most resigned in their last moments. The life of a sick person can be shortened not only by the acts, but also by the words or the manner of a physician. It is, therefore, a sacred duty to guard himself carefully in this respect, and to avoid all things which have a tendency to discourage the patient and to depress his spirits.

§ 5. A physician ought not to abandon a patient because the case is deemed incurable; for his attendance may continue to be highly useful to the patient, and comforting to the relatives around him, even in the last period of a fatal malady, by alleviating pain and other symptoms, and by soothing mental anguish. To decline attendance, under such circumstances, would be sacrificing to fanciful delicacy and mistaken liberality, that moral duty, which is independent of, and far superior to, all pecuniary consideration.

§ 6. Consultations should be promoted in difficult or protracted cases, as they give rise to confidence, energy, and more enlarged views in practice.

§ 7. The opportunity which a physician not unfrequently enjoys of promoting and strengthening the good resolutions of his

patients, suffering under the consequences of vicious conduct, ought never to be neglected. His counsels, or even remonstrances, will give satisfaction, not offence, if they be proffered with politeness, and evince a genuine love of virtue, accompanied by a sincere interest in the welfare of the person to whom they are addressed.

Art. II.—Obligations of patients to their physicians.

§ 1. The members of the medical profession, upon whom is enjoined the performance of so many important and arduous duties towards the community, and who are required to make so many sacrifices of comfort, ease, and health, for the welfare of those who avail themselves of their services, certainly have a right to expect and require, that their patients should entertain a just sense of the duties which they owe to their medical attendants.

§ 2. The first duty of a patient is, to select as his medical adviser one who has received a regular professional education. In no trade or occupation; do mankind rely on the skill of an untaught artist; and in medicine, confessedly the most difficult and intricate of the sciences, the world ought not to suppose that knowledge is intuitive.

§ 3. Patients should prefer a physician whose habits of life are regular, and who is not devoted to company, pleasure, or to any pursuit incompatible with his professional obligations. A patient should, also, confide the care of himself and family, as much as possible, to one physician; for a medical man who has become acquainted with the peculiarities of constitution, habits, and predispositions of those he attends, is more likely to be successful in his treatment than one who does not possess that knowledge.

A patient who has thus selected his physician, should always apply for advice in what may appear to him trivial cases, for the most fatal results often supervene on the slightest accidents. It is of still more importance that he should apply for assistance in the forming stage of violent diseases; it is to a neglect of this precept that medicine owes much of the uncertainty and imperfection with which it has been reproached.

§ 4. Patients should faithfully and unreservedly communicate to their physician the supposed cause of their disease. This is the more important, as many diseases of a mental origin simulate those depending on external causes, and are only to be cured by ministering to the mind diseased. A patient should never be afraid of thus making his physician his friend and adviser; he should always bear in mind that a medical man is under the strongest obligations of secrecy. Even the female sex should

never allow feelings of shame or delicacy to prevent their disclosing the seat, symptoms, and causes of complaints peculiar to them. However commendable a modest reserve may be in the common occurrences of life, its strict observance in medicine is often attended with the most serious consequences, and a patient may sink under a painful and loathsome disease, which might have been readily prevented had timely intimation been given to the physician.

§ 5. A patient should never weary his physician with a tedious detail of events or matters not appertaining to his disease. Even as relates to his actual symptoms, he will convey much more real information by giving clear answers to interrogatories, than by the most minute account of his own framing. Neither should he obtrude on his physician the details of his business nor the history of his family concerns.

§ 6. The obedience of a patient to the prescriptions of his physician should be prompt and implicit. He should never permit his own crude opinions as to their fitness, to influence his attention to them. A failure in one particular may render an otherwise judicious treatment dangerous, and even fatal. This remark is equally applicable to diet, drink, and exercise. As patients become convalescent, they are very apt to suppose that the rules prescribed for them may be disregarded, and the consequence, but too often, is a relapse. Patients should never allow themselves to be persuaded to take any medicine, whatever, that may be recommended to them by the self-constituted doctors and doctresses, who are so frequently met with, and who pretend to possess infallible remedies for the cure of every disease. However simple some of their prescriptions may appear to be, it often happens that they are productive of much mischief, and in all cases they are injurious, by contravening the plan of treatment adopted by the physician.

§ 7. A patient should, if possible, avoid even the *friendly visits of a physician* who is not attending him—and when he does receive them, he should never converse on the subject of his disease, as an observation may be made, without any intention of interference, which may destroy his confidence in the course he is pursuing, and induce him to neglect the directions prescribed to him. A patient should never send for a consulting physician without the express consent of his own medical attendant. It is of great importance that physicians should act in concert; for, although their modes of treatment may be attended with equal success when employed singly, yet conjointly they are very likely to be productive of disastrous results.

§ 8. When a patient wishes to dismiss his physician, justice and common courtesy require that he should declare his reasons for so doing.

§ 9. Patients should always, when practicable, send for their physician in the morning, before his usual hour of going out; for, by being early aware of the visits he has to pay during the day, the physician is able to apportion his time in such a manner as to prevent an interference of engagements. Patients should also avoid calling on their medical adviser unnecessarily during the hours devoted to meals or sleep. They should always be in readiness to receive the visits of their physician, as the detention of a few minutes is often of serious inconvenience to him.

§ 10. A patient should, after his recovery, entertain a just and enduring sense of the value of the services rendered him by his physician; for these are of such a character, that no mere pecuniary acknowledgment can repay or cancel them.

OF THE DUTIES OF PHYSICIANS TO EACH OTHER, AND TO THE PROFESSION AT LARGE.

Art. I.—Duties for the support of professional character.

§ 1. Every individual, on entering the profession, as he becomes thereby entitled to all its privileges and immunities, incurs an obligation to exert his best abilities to maintain its dignity and honor, to exalt its standing, and to extend the bounds of its usefulness. He should, therefore, observe strictly, such laws as are instituted for the government of its members;—should avoid all contumelious and sarcastic remarks relative to the faculty, as a body; and while, by unwearied diligence, he resorts to every honorable means of enriching the science, he should entertain a due respect for his seniors, who have, by their labors, brought it to the elevated condition in which he finds it.

§ 2. There is no profession, from the members of which greater purity of character, and a higher standard of moral excellence are required, than the medical; and to attain such eminence, is a duty every physician owes alike to his profession and to his patients. It is due to the latter, as without it he cannot command their respect and confidence, and to both, because no scientific attainments can compensate for the want of correct moral principles. It is also incumbent upon the faculty to be temperate in all things, for the practice of physic requires the unremitting exercise of a clear and vigorous understanding; and, on emergencies, for which no professional man should be unprepared, a steady hand, an acute eye, and an unclouded head may be essential to the well-being, and even to the life, of a fellow-creature.

§ 3. It is derogatory to the dignity of the profession to resort to public advertisements, or private cards, or handbills, inviting the

attention of individuals affected with particular diseases—publicly offering advice and medicine to the poor gratis, or promising radical cures; or to publish cases and operations in the daily prints, or suffer such publications to be made; to invite laymen to be present at operations, to boast of cures and remedies, to adduce certificates of skill and success, or to perform any other similar acts. These are the ordinary practices of empirics, and are highly reprehensible in a regular physician.

§ 4. Equally derogatory to professional character is it, for a physician to hold a patent for any surgical instrument or medicine; or to dispense a secret *nostrum*, whether it be the composition or exclusive property of himself or of others. For, if such nostrum be of real efficacy, any concealment regarding it is inconsistent with beneficence and professional liberality; and, if mystery alone give it value and importance, such craft implies either disgraceful ignorance or fraudulent avarice. It is also reprehensible for physicians to give certificates attesting the efficacy of patent or secret medicines, or in any way to promote the use of them.

Art. II.—Professional services of physicians to each other.

§ 1. All practitioners of medicine, their wives, and their children, while under the paternal care, are entitled to the gratuitous services of any one or more of the faculty residing near them, whose assistance may be desired. A physician afflicted with disease is usually an incompetent judge of his own case; and the natural anxiety and solicitude which he experiences at the sickness of a wife, a child, or any one who, by the ties of consanguinity, is rendered peculiarly dear to him, tend to obscure his judgment, and produce timidity and irresolution in his practice. Under such circumstances, medical men are peculiarly dependent upon each other, and kind offices and professional aid should always be cheerfully and gratuitously afforded. Visits ought not, however, to be obtruded officiously; as such unasked civility may give rise to embarrassment, or interfere with that choice on which confidence depends. But, if a distant member of the faculty, whose circumstances are affluent, request attendance, and an honorarium be offered, it should not be declined; for no pecuniary obligation ought to be imposed, which the party receiving it would wish not to incur.

Art. III.—Of the duties of Physicians as respects vicarious offices.

§ 1. The affairs of life, the pursuit of health, and the various accidents and contingencies to which a medical man is peculiarly

exposed, sometimes require him temporarily to withdraw from his duties to his patients, and to request some of his professional brethren to officiate for him. Compliance with this request is an act of courtesy, which should always be performed with the utmost consideration for the interest and character of the family physician, and when exercised for a short period, all the pecuniary obligations for such service should be awarded to him. But if a member of the profession neglect his business in quest of pleasure and amusement, he cannot be considered as entitled to the advantages of the frequent and long-continued exercise of this fraternal courtesy, without awarding to the physician who officiates the fees arising from the discharge of his professional duties.

In obstetrical and important surgical cases, which give rise to unusual fatigue, anxiety, and responsibility, it is just that the fees accruing therefrom should be awarded to the physician who officiates.

Art. IV.—Of the duties of physicians in regard to consultations.

§ 1. A regular medical education furnishes the only presumptive evidence of professional abilities and acquirements, and ought to be the only acknowledged right of an individual to the exercise and honors of his profession. Nevertheless, as in consultations the good of the patient is the sole object in view, and this is often dependent on personal confidence, no intelligent regular practitioner, who has a license to practice from some medical board of known and acknowledged respectability, recognized by this association, and who is in good moral and professional standing in the place in which he resides, should be fastidiously excluded from fellowship, or his aid refused in consultation, when it is requested by the patient. But no one can be considered as a regular practitioner or a fit associate in consultation, whose practice is based on an exclusive dogma, to the rejection of the accumulated experience of the profession, and of the aids actually furnished by anatomy, physiology, pathology, and organic chemistry.

§ 2. In consultations, no rivalship or jealousy should be indulged; candor, probity, and all due respect should be exercised towards the physician having charge of the case.

§ 3. In consultations, the attending physician should be the first to propose the necessary questions to the sick; after which the consulting physician should have the opportunity to make such farther inquiries of the patient as may be necessary to satisfy him of the true character of the case. Both physicians should then retire to a private place for deliberation; and the one

first in attendance should communicate the directions agreed upon to the patient or his friends, as well as any opinions which it may be thought proper to express. But no statement or discussion of it should take place before the patient or his friends, except in the presence of all the faculty attending, and by their common consent; and no *opinions* or *prognostications* should be delivered, which are not the result of previous deliberation and concurrence.

§ 4. In consultations, the physician in attendance should deliver his opinion first; and when there are several consulting, they should deliver their opinions in the order in which they have been called in. No decision, however, should restrain the attending physician from making such variations in the mode of treatment, as any subsequent unexpected change in the character of the case may demand. But such variation, and the reasons for it, ought to be carefully detailed at the next meeting in consultation. The same privilege belongs also to the consulting physician if he is sent for in an emergency, when the regular attendant is out of the way, and similar explanations must be made by him at the next consultation.

§ 5. The utmost punctuality should be observed in the visits of physicians when they are to hold consultations together, and this is generally practicable, for society has been considerate enough to allow the plea of a professional engagement to take precedence of all others, and to be an ample reason for the relinquishment of any present occupation. But, as professional engagements may sometimes interfere, and delay one of the parties, the physician who first arrives should wait for his associate a reasonable period, after which the consultation should be considered as postponed to a new appointment. If it be the attending physician who is present, he will of course see the patient and prescribe; but if it be the consulting one, he should retire, except in case of emergency, or when he has been called from a considerable distance, in which latter case he may examine the patient, and give his opinion in *writing*, and *under seal*, to be delivered to his associate.

§ 6. In consultations, theoretical discussions should be avoided, as occasioning perplexity and loss of time. For there may be much diversity of opinion concerning speculative points, with perfect agreement in those modes of practice which are founded, not on hypothesis, but on experience and observation.

§ 7. All discussions in consultation should be held as secret and confidential. Neither by words nor manner should any of the parties to a consultation assert or insinuate, that any part of the treatment pursued did not receive his assent. The responsibility must be equally divided between the medical attendants—they must equally share the credit of success as well as the blame of failure.

§ 8. Should an irreconcilable diversity of opinion occur when several physicians are called upon to consult together, the opinion of the majority should be considered as decisive; but if the numbers be equal on each side, then the decision should rest with the attending physician. It may, moreover, sometimes happen, that two physicians cannot agree in their views of the nature of a case, and the treatment to be pursued. This is a circumstance much to be deplored, and should always be avoided, if possible, by mutual concessions, as far as they can be justified by a conscientious regard for the dictates of judgment. But, in the event of its occurrence, a third physician should, if practicable, be called to act as umpire; and if circumstances prevent the adoption of this course, it must be left to the patient to select the physician in whom he is most willing to confide. But, as every physican relies upon the rectitude of his judgment, he should, when left in the minority, politely and consistently retire from any farther deliberation in the consultation, or participation in the management of the case.

§ 9. As circumstances sometimes occur to render a *special consultation* desirable, when the continued attendance of two physicians might be objectionable to the patient, the member of the faculty whose assistance is required in such cases, should sedulously guard against all future unsolicited attendance. As such consultations require an extraordinary portion of both time and attention, at least a double honorarium may be reasonably expected.

§ 10. A physician who is called upon to consult, should observe the most honorable and scrupulous regard for the character and standing of the practitioner in attendance; the practice of the latter, if necessary, should be justified as far as it can be, consistently with a conscientious regard for truth, and no hint or insinuation should be thrown out which could impair the confidence reposed in him, or affect his reputation. The consulting physician should also carefully refrain from any of those extraordinary attentions or assiduities, which are too often practised by the dishonest for the base purpose of gaining applause, or ingratiating themselves into the favor of families and individuals.

Art. V.—Duties of Physicians in cases of interference.

§ 1. Medicine is a liberal profession, and those admitted into its ranks should found their expectations of practice upon the extent of their qualifications, not on intrigue or artifice.

§ 2. A physician, in his intercourse with a patient under the care of another practitioner, should observe the strictest caution and reserve. No meddling inquiries should be made—no disingenuous hints given relative to the nature and treatment of his

disorder; nor any course of conduct pursued that may directly or indirectly tend to diminish the trust reposed in the physician employed.

§ 3. The same circumspection and reserve should be observed when, from motives of business or friendship, a physician is prompted to visit an individual who is under the direction of another practitioner. Indeed, such visits should be avoided except under peculiar circumstances; and when they are made, no particular inquiries should be instituted relative to the nature of the disease, or the remedies employed, but the topics of the conversation should be as foreign to the case as circumstances will admit.

§ 4. A physician ought not to take charge of or prescribe for a patient who has been recently under the care of another member of the faculty in the same illness, except in cases of sudden emergency, or in consultation with the physician previously in attendance, or when the latter has relinquished the case, or been regularly notified that his services are no longer desired. Under such circumstances no unjust and illiberal insinuations should be thrown out in relation to the conduct or practice previously pursued, which should be justified as far as candor and regard for truth and probity will permit; for it often happens that patients become dissatisfied when they do not experience immediate relief, and, as many diseases are naturally protracted, the want of success, in the first stage of treatment, affords no evidence of a lack of professional knowledge and skill.

§ 5. When a physician is called to an urgent case, because the family attendant is not at hand, he ought, unless his assistance in consultation be desired, to resign the care of the patient to the latter immediately on his arrival.

§ 6. It often happens, in cases of sudden illness, or of recent accidents and injuries, owing to the alarm and anxiety of friends, that a number of physicians are simultaneously sent for. Under these circumstances, courtesy should assign the patient to the first who arrives, who should select from those present, any additional assistance that he may deem necessary. In all such cases, however, the practitioner who officiates should request the family physician, if there be one, to be called, and, unless his farther attendance be requested, should resign the case to the latter on his arrival.

§ 7. When a physician is called to the patient of another practitioner, in consequence of the sickness or absence of the latter, he ought, on the return or recovery of the regular attendant, and with the consent of the patient, to surrender the case.

§ 8. A physician, when visiting a sick person in the country, may be desired to see a neighboring patient who is under the regular direction of another physician, in consequence of some

sudden change or aggravation of symptoms. The conduct to be pursued on such an occasion is to give advice adapted to present circumstances; to interfere no farther than is absolutely necessary with the general plan of treatment; to assume no future direction, unless it be expressly desired; and, in this last case, to request an immediate consultation with the practitioner previously employed.

§ 9. A wealthy physician should not give advice *gratis* to the affluent; because his doing so is an injury to his professional brethren. The office of a physician can never be supported as an exclusively beneficent one; and it is defrauding in some degree, the common funds for its support, when fees are dispensed which might justly be claimed.

§ 10. When a physician who has been engaged to attend a case of midwifery is absent, and another is sent for, if delivery is accomplished during the attendance of the latter, he is entitled to the fee, but should resign the patient to the practitioner first engaged.

Art. VI.—Of differences between physicians.

§ 1. Diversity of opinion and opposition of interest, may, in the medical as in other professions, sometimes occasion controversy and even contention. Whenever such cases unfortunately occur, and cannot be immediately terminated, they should be referred to the arbitration of a sufficient number of physicians, or a *court-medical.*

§ 2. As peculiar reserve must be maintained by physicians towards the public, in regard to professional matters, and as there exist numerous points in medical ethics and etiquette through which the feelings of medical men may be painfully assailed in their intercourse with each other, and which cannot be understood or appreciated by general society, neither the subject-matter of such differences nor the adjudication of the arbitrators should be made public, as publicity in a case of this nature may be personally injurious to the individuals concerned, and can hardly fail to bring discredit on the faculty.

Art. VII.—Of pecuniary acknowledgments.

Some general rules should be adopted by the faculty, in every town or district, relative to *pecuniary acknowledgments* from their patients; and it should be deemed a point of honor to adhere to these rules with as much uniformity as varying circumstances will admit.

OF THE DUTIES OF THE PROFESSION TO THE PUBLIC, AND OF THE OBLIGATIONS OF THE PUBLIC TO THE PROFESSION.

Art. I.—Duties of the profession to the public.

§ 1. As good citizens, it is the duty of physicians to be ever vigilant for the welfare of the community, and to bear their part in sustaining its institutions and burdens; they should also be ever ready to give counsel to the public in relation to matters especially appertaining to their profession, as on subjects of medical police, public hygiène, and legal medicine. It is their province to enlighten the public in regard to quarantine regulations—the location, arrangement, and dietaries of hospitals, asylums, schools, prisons, and similar institutions—in relation to the medical police of towns, as drainage, ventilation, &c.—and in regard to measures for the prevention of epidemic and contagious diseases; and when pestilence prevails, it is their duty to face the danger, and to continue their labors for the alleviation of the suffering even at the jeopardy of their own lives.

§ 2. Medical men should also be always ready, when called on by the legally constituted authorities, to enlighten coroners' inquests, and courts of justice, on subjects strictly medical—such as involve questions relating to sanity, legitimacy, murder by poisons or other violent means, and in regard to the various other subjects embraced in the science of Medical Jurisprudence. But in these cases, and especially where they are required to make a *post-mortem* examination, it is just, in consequence of the time, labor, and skill required, and the responsibility and risk they incur, that the public should award them a proper honorarium.

§ 3. There is no profession, by the members of which eleemosynary services are more liberally dispensed than the medical, but justice requires that some limits should be placed to the performance of such good offices. Poverty, professional brotherhood, and certain of the public duties referred to in the first section of this article, should always be recognized as presenting valid claims for gratuitous services; but neither institutions endowed by the public or by rich individuals, societies for mutual benefit, for the insurance of lives or for analogous purposes, nor any profession or occupation, can be admitted to possess such privilege. Nor can it be justly expected of physicians to furnish certificates of inability to serve on juries, to perform militia duty, or to testify to the state of health of persons wishing to insure their lives, obtain pensions, or the like, without a pecuniary acknowledgment. But to individuals in indigent circumstances, such professional services should always be cheerfully and freely accorded.

§ 4. It is the duty of physicians, who are frequent witnesses of the enormities committed by quackery, and the injury to health and even the destruction of life caused by the use of quack medicines, to enlighten the public on these subjects, to expose the injuries sustained by the unwary from the devices and pretensions of artful empirics and impostors. Physicians ought to use all the influence which they may possess, as professors in Colleges of Pharmacy, and by exercising their option in regard to the shops to which their prescription shall be sent, to discourage druggists and apothecaries from vending quack or secret medicines, or from being in any way engaged in their manufacture and sale.

Art. II.—Obligations of the public to physicians.

§ 1. The benefits accruing to the public, directly and indirectly, from the active and unwearied beneficence of the profession, are so numerous and important, that physicians are justly entitled to the utmost consideration and respect from the community. The public ought likewise to entertain a just appreciation of medical qualification; to make a proper discrimination between true science and the assumptions of ignorance and empiricism—to afford every encouragement and facility for the acquisition of medical education—and no longer to allow the statute-books to exhibit the anomaly of exacting knowledge from physicians, under a liability to heavy penalties, and of making them obnoxious to punishment for resorting to the only means of obtaining it.